AMERICAN ARTISAN

WARM AIR HEATING • SHEET METAL CONTRACTING • AIR CONDITIONING

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MAY 9,
1932

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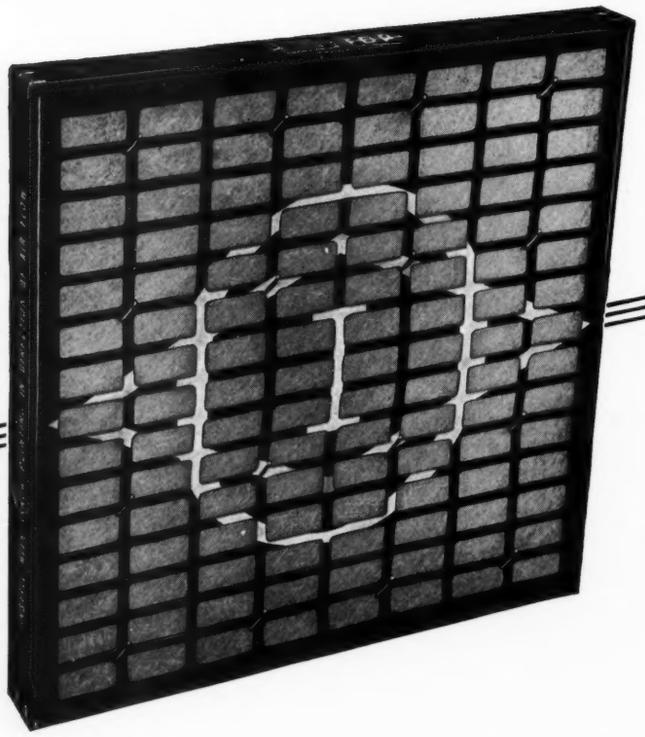

for the first time you can sell clean air to gravity warm air furnace users

● For the first time in the history of the warm air field there is offered, not as an experiment, but as a tested success, DUSTOP, an air filter that can be used on gravity warm air furnaces.

Here is a field never before touched . . . offering you, tremendous merchandising opportunities.

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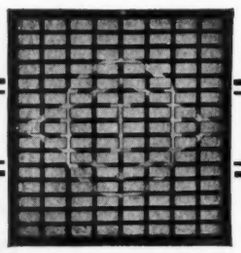
Get in touch with your furnace manufacturers or us for the interesting story of DUSTOP. Owens-Illinois Glass Company, Industrial Materials Division, Toledo, Ohio.



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20%
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1845-1935 LUDLOW AVENUE - - INDIANAPOLIS, INDIANA

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in
Gravity Warm Air Heating
Forced Warm Air Heating
Sheet Metal Contracting
Air Conditioning
Merchandising
Ventilating

AMERICAN ARTISAN

Founded 1880

VOL. 101 ▼ No. 10

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Entered as second-class matter, January 29, 1930, at the Post office at Chicago, Illinois, under the act of March 3, 1879. Formerly entered on June 25, 1887, as American Artisan and Hardware Record

EYE APPEAL means SALES APPEAL

A well proportioned square casing with mar-proof maroon crystalline finish trimmed in black gives Niagara DeLuxe exceptionally attractive appearance. All sections fit perfectly together without the need of a single bolt to break the smooth exterior. Send for complete information about this remarkable furnace value today.

Niagara DeLuxe is Especially Well Adapted to Coal Fired Air Conditioning Installations.

TODAY'S trend is toward modern basements. Today, more than ever before, attractive appearance—EYE appeal—plays its important part in SALES appeal.

Add the eye appeal of Niagara DeLuxe to Niagara's long established record of efficiency, economy, and cleanliness, and you have a warm air furnace of outstanding value.

Beauty on the outside—sterling quality inside—from top to bottom and through and through, it represents the latest achievements in furnace design and construction—*plus* SALES APPEAL.

Of course it has all the many features that make all Niagara furnaces outstanding values. Choice of three types of grates, including the exclusive Niagara Duplex Grate. One piece base that speeds installation. Large ash pit shaped for quick and thorough cleaning. Fire box that cannot warp, and extracts a higher percentage of heat from the fuel. Easy firing because of the wider door. One-piece radiator—extra large humidifier—smoke consumer—smoke proof construction, all Niagara features.

Triple thick insulated casing reduces heat loss to a minimum. Smoke vent can be taken off either side or the rear, permitting location in most convenient place and adding to attractive appearance of basement. Available in a wide range of sizes to meet the exact needs of every home.

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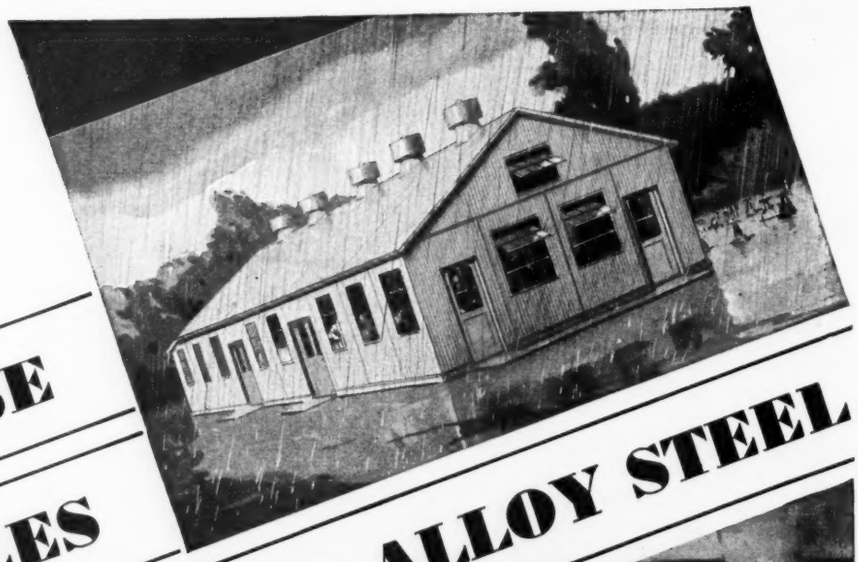
THE FOREST CITY FOUNDRIES COMPANY · CLEVELAND, OHIO

Warm Air Heating Engineers Since 1893

NIAGARA De-Luxe WARM AIR FURNACE



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Copper-bearing steel costs less than other corrosion-resisting materials, and only slightly more than ordinary commercial grades of steel.

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Sheets Strip Plates
Bands Structurals Piling
Rails Track Accessories
Bars Rivets Billets

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Specify Barnes for Quality with Service.

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Barnes

OF SERVICE

BARNES METAL PRODUCTS COMPANY

4425 W. 16th Street — MANUFACTURERS OF CONDUCTOR PIPE, ELBOWS, EAVES TROUGH AND FITTINGS. ALL SIZES. ALL METALS — **Chicago, Illinois**

● Would you picture for yourself American advertising as it existed two decades ago? Follow business, then, as it seeks the markets of the world. Survey with men in American advertising agencies, the field of media in Britain, on the Continent, in South America, in the Far East.

There, in circulation claims, chaos still prevails. Expensive research and constant vigilance are needed in buying space. Advertising must surmount a needless hurdle—an obstacle which in this country has been removed forever.

Facing the same conditions under which advertising still struggles in other lands, American advertising sixteen years ago demanded a change. The regulatory force came from within. Advertisers, advertising agencies and publishers joined in founding the Audit Bureau of Circulations.

Everybody today knows the plainly printed reports of the A. B. C. They cover almost every important publication. They are packed with facts which the wise buyer of space takes pains to heed.

Men who seek the last dollar of value in their advertising budgets are not content with figures on paid circulation only. They search out the whole story, as told in the complete A. B. C. reports. And therein they find the gauge to true values in the selection of advertising media, the means to make an appropriation yield the results that modern business demands.

As a recognition of service, not only agencies and publishers, but a distinguished group of advertisers in the United States and Canada, hold membership today in the Audit Bureau of Circulations.

STANLEY RESOR

***President*, J. Walter Thompson Company**

"I thought that we had some appreciation of the value of the A. B. C. until we started work in countries where circulations are not audited. It is difficult for anyone in this country to realize what the absence of audited figures means in additional outlay of time, work, and money. In many offices in other countries it has taken our organization literally months of intensive advance work solely on the problems of circulation. Most of the information obtained under these difficulties, had there been an A. B. C., would have been instantly available.

"To these first costs must be added the continuing cost of keeping circulation data up to date.

"I think it can be safely said that the A. B. C. is one of the outstanding successful co-operative undertakings of the generation."

Stanley Resor

GEORGE PEARSON

Director of Media

Chicago Office, J. Walter Thompson Company

"Perhaps only those of us who have been buying advertising space for a time we have to measure in decades, can fully appreciate the great job the A. B. C. has done. And its work is just as necessary now as it ever was in the past.

"I think the current trend of business requires us all to give more detailed study than ever before to actual A. B. C. Audit Reports and Publisher's Statements. To appraise the circulation of a publication intelligently, we must know the distribution, circulation methods, subscription prices and other facts that are reliably shown only in the reports of the Bureau.

Geo Pearson

An advertisement by the
AUDIT BUREAU OF CIRCULATIONS
Executive Offices • • • Chicago

Modeled after the Capitol at Washington

even to the selection of Revere Sheet Copper

Bollinger

State Capitol at Charleston, West Virginia. Revere Sheet Copper was used. A portion of this copper was furnished as Revere Leadtex. The balance was Revere Copper, lead-coated. Architect: Cass Gilbert. General Building Contractor: George A. Fuller Company. Sheet Metal Contractor: E. Van Noorden Co., Boston. Stamped work: Miller & Doing, Brooklyn. Lead Coating: Wheeling Metal and Manufacturing Co.

West Virginia has a new State Capitol. It stands on the banks of the Great Kanawha River, at Charleston.

This majestic building was modeled after the National Capitol at Washington . . . in architectural design and also in another important specification.

Revere Sheet Copper was used on dome and roof of the National Capitol in 1814. Revere Sheet Copper was chosen for dome and roof of the new State Capitol.

The dome is covered with stamped decorative panels of Revere Leadtex. The rest is Revere copper, lead-coated.

Revere Copper was used because of the protection it provides against time, the elements and corrosion. It was lead-coated to give it the true, mellow tones of lead, at a considerable saving in weight and cost.

✣ ✣ ✣

Jobs like this are building Revere prestige . . . which in turn is creating a real preference for Revere products.

Both prestige and preference are important to Sheet Metal Contractors as aids in securing business. Important also are the permanence, quality and satisfaction of Revere products. No wonder Sheet Metal Contractors find it profitable to use Revere products.

For further information, address Revere Copper and Brass Incorporated, 230 Park Ave., N. Y. C.

Revere Copper *and* Brass

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Revere COPPER BRASS Products

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Dallas *Division, Chicago, Ill.* Taunton-New Bedford *Division, Taunton, Mass.* Rome *Division, Rome, N. Y.*

EXECUTIVE OFFICES: NEW YORK CITY
GENERAL OFFICES: ROME, N. Y.

"I Have a Right to be Proud . . . "

says—

Agricola "SUPREME"

"FURNACE WARMTH FROM THE SUNNY SOUTH"

"No sir-eee! I don't have to take my crown off to anybody. When it comes to quality and efficiency—I'M THERE.

"Look me over: streamline designed castings that speed up the passage of air and increase heating efficiency*; slip-over front that eliminates bolts and cement; and other advantages that reduce installing time 25 to 35 percent.

"No wonder I've gone over so big with users and dealers. Users enjoy clean, balmy, healthful heat at low cost; dealers swell their profits.

"With my popularity and your ability, we can make money together.

"A brief note from you will bring details."

—Agricola "Supreme"
LEADER OF FURNACES

*Each size of the Agricola "Supreme" has a greater heating capacity than the corresponding size of other furnaces (Standard Code Ratings).

AGRICOLA FURNACE CO., Inc.
Gadsden, Alabama
Offices in Principal Cities

VOLUME 101

AMERICAN ARTISAN

NUMBER 10

WARM AIR HEATING • SHEET METAL CONTRACTING • AIR CONDITIONING

Our Big Opportunity—Air Conditioning

WE have commented quite frequently on this editorial page on the various phases of air conditioning development. Most of these comments have attempted to show that this market is here right now and that, furthermore, the scope of this market is widening every day.

Verification of our statements have been received every week, but one of the best analyses it has been our pleasure to receive comes from a man who has been intimately connected with furnace affairs for a great many years and who has just recently completed an investigation into small sized air conditioning and its future field.

We feel that this man's comments are worth passing along. He says:

"The furnace dealer or progressive sheet metal contractor, if he is alert and capable, should see an opportunity for himself in this industry far greater than any opportunity offered in recent years. Fortunately the better dealers are availing themselves of the help, valuable information, and data, offered by associations, societies, publications and manufacturers, but there are still many dealers who because of diminishing business, say they will wait and see what happens. With the help offered and publicity given every day to air conditioning there is no excuse why every capable dealer should not take heart and work hard to help the air conditioning industry grow as well as to help himself.

"In past years the furnace dealer has used various methods to enlarge his sales, but at present these past methods are inadequate. The incompetent dealer has never been able to survive indefinitely even in normal times and today it is still more a case of survival of the fittest. The air conditioning field is now knocking loudly at the dealer's door waiting to be taken advantage of, but we cannot expect it to wait indefinitely.

"This is because such momentum has already been gained, that the whole country is thinking and talking air conditioning, is receptive to it, and astounded at the examples of great home benefits it offers. Full page ads in the Saturday Evening Post, illustrated articles in most of the best magazines and articles in practically all sorts of weekly and monthly publications together with newspaper publicity, are all constantly appearing and helping to make the market, already here, grow by leaps and bounds. Even universities are now teaching air conditioning.

"If furnace dealers are too indifferent to learn what it is all about or too lazy to secure business when they need it so badly, this will not hinder the progress of air conditioning as new sources of distribution and merchandising are already appearing to invade the home air conditioning market. The furnace dealer still has the best and first opportunity, but the plumbing and radiator heating dealer is already getting into action and great interests, much larger than the largest now existing in the furnace industry, are preparing to enter the field. Big interests with well planned distribution schemes, like the larger mail order companies, are already in the furnace business and are getting ready for air conditioning.

"It is fortunate that air conditioning covers such a broad field aside from the home application. This helps to advertise it and make it more salable for homes and also limits, somewhat, the competitive selling in the home field. The greatest efforts so far have been toward development for large buildings, theaters, office buildings, etc., and numerous industrial applications. Also, because air conditioning for homes is so varied in its extent and scope, we find very complicated, elaborate, expensive installations for homes alongside of comparatively simple and inexpensive installations either assembled or sold as factory built unit air conditioners.

"The market for the simpler and less expensive equipment is without doubt the biggest potential market and today offers the best opportunity to the furnace dealer.

"We have been surprised to discover that most heating men don't know how many furnace installations there are in their city or territory. Practically every gravity system can be transformed into an air conditioning system at low cost. These jobs rightfully belong to the furnace dealer. If we sit tight the other fellow will get them. Dealers can now offer assembled or complete air conditioning units for existing furnaces to provide year round comfort and increased furnace efficiency. Such jobs can be made to carry a substantial profit.

"Every furnace dealer who maintains a display should have an air conditioner display, an active alive display, which will make selling far easier than will pictures or print or talk. It is entirely reasonable that the furnace dealer, if he hopes to continue in business, not only needs, but cannot afford to overlook, a close relationship between his furnace heating and air conditioning. The promotion of air conditioning is largely already accomplished, in most cases independently of the furnace dealer, who has the greatest present opportunity of all to benefit."

Comfort Cooling For Homes

A description of a contractors own home installation in which ice was used for summer cooling and a discussion of the many interesting things about cooling this man discovered in his experiments to get comfort.

By **JOHN H. KITCHEN**
Kitchen Engineering Co.

THE demand for cooling in homes, results from the education given the public by the numerous examples of air conditioning in theaters, shops and eating places. The demand is to be noted particularly in those sections of the country where either or both summer temperatures and humidities are so high as to cause great discomfort, loss of sleep, and inefficiency in work. Unfortunate summer "stay-at-homes" appreciate anything which will bring the relief of the sea shore to them in their crowded cities.

The following description, illustrations and data, apply to a residence of modern size, and are therefore typical of many already built, *but not designed for cooling.*

The residence in question fronts toward the west and south, the east side being protected by a nearby residence. The north exposure has equivalent area to the south end, but is not affected by the sun, as with the rooms having south and west exposure.

The building is of stucco and is about twelve years old. By reference to the exterior view and to the floor plans, it will be noted that the number of windows is above the average. The total glass surface is 210 sq. ft. Cubic contents, first and second floors, is 15,794 cu. ft.

This residence was built prior to the period of insulation. The builder apparently had in mind the maximum of sunlight and plenty of windows for circulation of air. The attic space was floored, but not insulated, ditto the roof. The windows are equipped with metal weather stripping, which minimize leakage and proved beneficial in the heating season.

The prevailing wind in winter is from the northwest, and in summer from the southwest. Thus the residence presented an interesting problem from the standpoint of heating as well as summer cooling.

Reference to the basement plan shows:

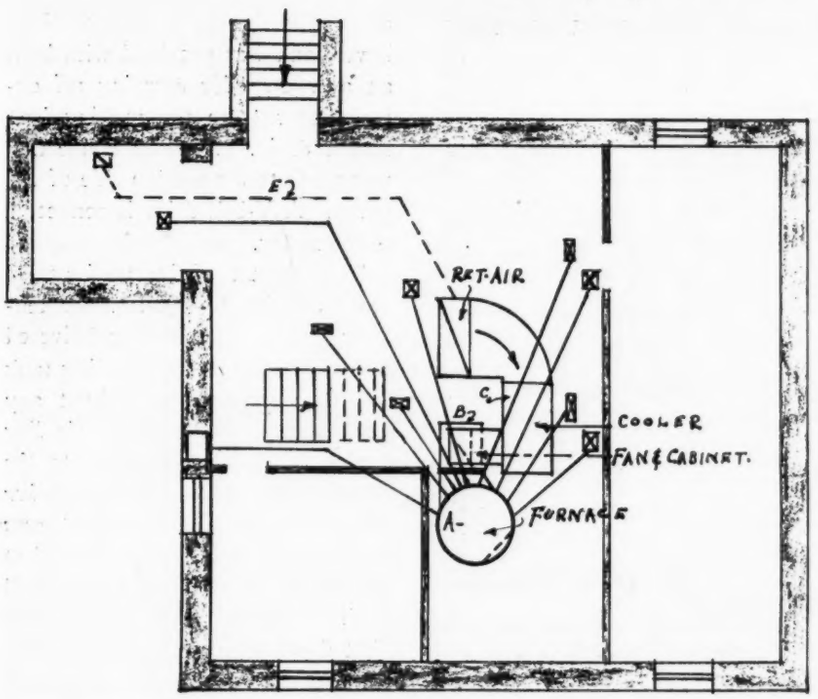
(a) Furnace of adequate size converted from coal to gas, automatically controlled.

(b) Pressure fan in the return air box.

(c) Cooling Unit located between the return air register and the fan.

(d) Round pipes of adequate size to each room, equidistant to main rooms.

Mr. Kitchen's home is a comfortable structure about 12 years old. No special construction was employed to make cooling easy or economical. Hundreds of similar homes stand in every community



The original heating plant was gravity warm air. This first system was altered to the one shown here, which is forced air, but uses the old round pipe leaders. Dampers were used for adjustment

(e) Supplementary return air to maid's room.

Aside from (e) the only return air register was in the first floor corridor.

Heating Changes

When we purchased the residence it was equipped with a gravity furnace system. The first winter was severe, but all the rooms were comfortable with the exception of those on the north side. However, the coal consumption was excessive. It was quickly evident that the circulation of air was not sufficient to offset the increased heat loss on windy days. Uniform temperature was readily secured by adding a pressure fan. The amount of fuel used was likewise reduced. Slight adjustments were made in the return air box to accommodate the fan and motor. *No changes were made in existing warm air pipes,* or *in the return air.* Necessary damper adjustment was made in the individual pipes, thereby equalizing the air delivery to the various rooms. An automatic humidifier was added at slight expense. We then had a plant embodying the essential winter "Health and Comfort" features, namely—Temperature, Humidity and Positive Air Circulation, warmer floors. The cost of the fan and humidifier was less than $200.00. The expense of the fan was entirely justified by the saving secured in fuel, plus additional satisfaction and comfort.

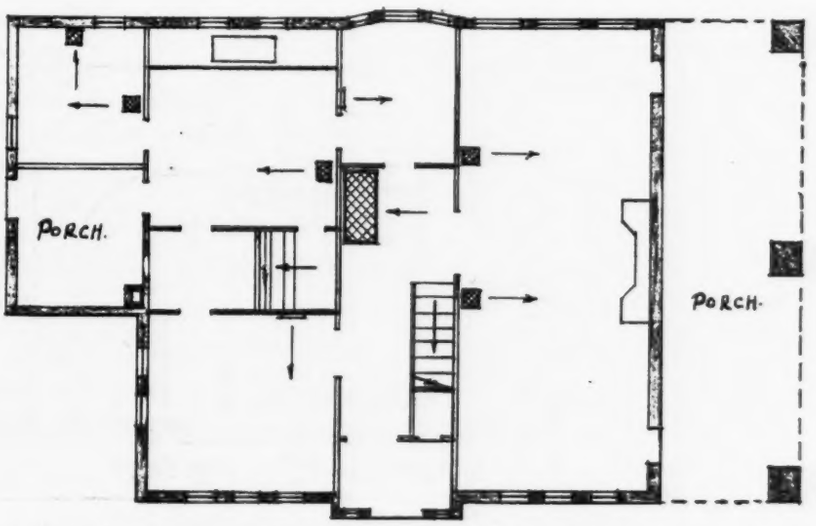
Air filters of the slide-out type, were installed in the return air box, thus eliminating any complaint from dust or dirt. My wife was surprised to note the effect of filters, as she found the window shades and curtains did not require the customary "once a year" house cleaning of former times. Further, there was no marking on the wall paper. It is surprising to note the beneficial effect of air filters and too much emphasis cannot be put on their value. From the health standpoint, filters tend to decrease nasal irritations and minimize tendency to colds. Thus the old gravity plant was modernized and the heating problem solved, and made more economical in operation, more efficient and healthful.

Summer Cooling

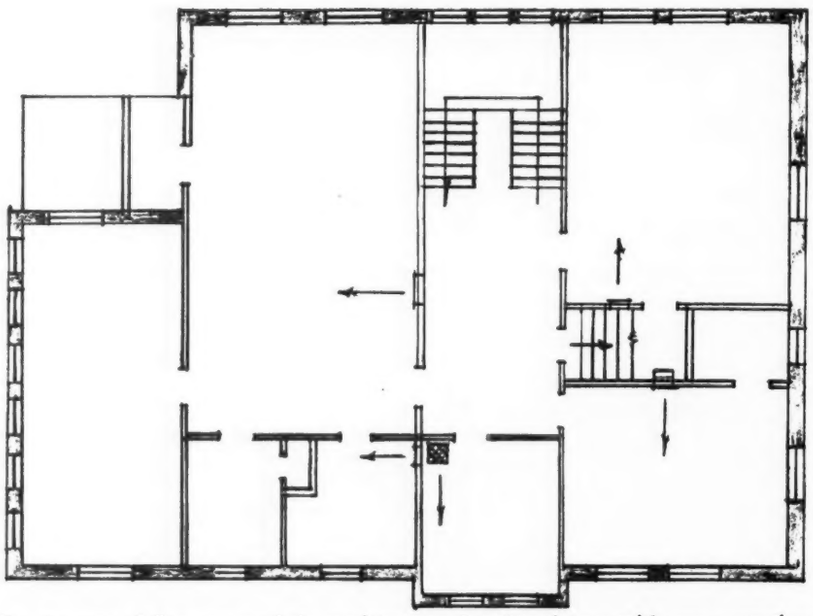
The accompanying illustration "B" used in connection with basement plan, shows how the existing fan was used for cooling, without any change except a bypass duct from the return air to the cooler, and from the cooler to the fan. No change was made in pipe or duct sizes. Chilled air is introduced through the warm air pipes, and the air to be cooled is passed through iced water sprays, *thus extracting heat from the returned air.*

The fan serves the double purpose of assisting the heater in winter and moving cooled air in the summer.

Experience has proved that accelerated air in summer has some cooling effect. Thus the fan used is of the three speed type. By operating the fan at "top" speed, when



The first floor plan shows floor registers along inside walls with one large return floor grille in the central hall



On the second floor most of the registers are baseboard type with one exception. There is no direct return from the second floor. However, the hall is large and centrally located

outside temperature is 90-deg. F. or below, the "Comfort Condition" in the rooms was improved without the operation of the ice charged cooler. To accomplish this the windows and doors were kept closed, and the windows (particularly of the first floor) were *kept shaded against the rays of the sun.*

The following temperatures indicate the results obtained on a hot day, with ice for reducing temperatures of water sprays:

Outside dry bulb.....101-deg. F.
Inside dry bulb..... 82-deg. F.
Inside relative humidity.... 55%
Supply register temperature 70-deg. F.
Total c.f.m. 1200, 1/20 h.p. motor.
Total cubic contents.....15,794

Cubic contents main rooms cooled on first floor to above temperature is 7,318 cu. ft. and partial cooling of second floor, large bedroom, hallway and bath room, 4,603 cu. ft.

An inside dry bulb temperature of 82-deg., with a relative humidity of 55% proved satisfactory at an outside temperature of 101-deg., and without undue shock. When the temperature outside rose to 107-deg. it was found that 85-deg. to 87-deg. was sufficiently low for comfort.

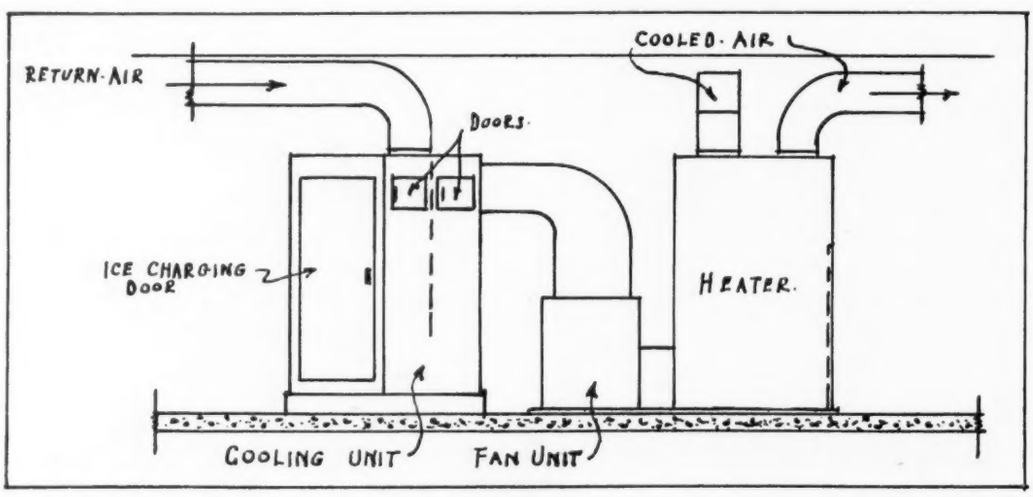
The air to be cooled does not come in contact with the ice. The cooling tank is in two compartments, one for ice storage and the other for the twin sprays. The lower tank was provided with both an overflow (for carrying off excess water from the melting ice) and a drain. Another connection was made to the suction side of the pump. A V-belt drive is connected to the motor.

The amount of ice used varied from 300-lbs. to 600-lbs. per ten-hour period. This ice was delivered and placed in the ice charging tank by the ice company, without any annoyance. *The cost of Cooling varied in direct proportion to the outside temperature* and the *number of hours the Cooling Plant was operated.* It was usually started at ten to eleven a. m. and continued until sundown. The pump was shut down as soon as the ice melting ceased, but the fan continued to operate. Thus the *Cooling effect continued for several hours after the ice was melted.*

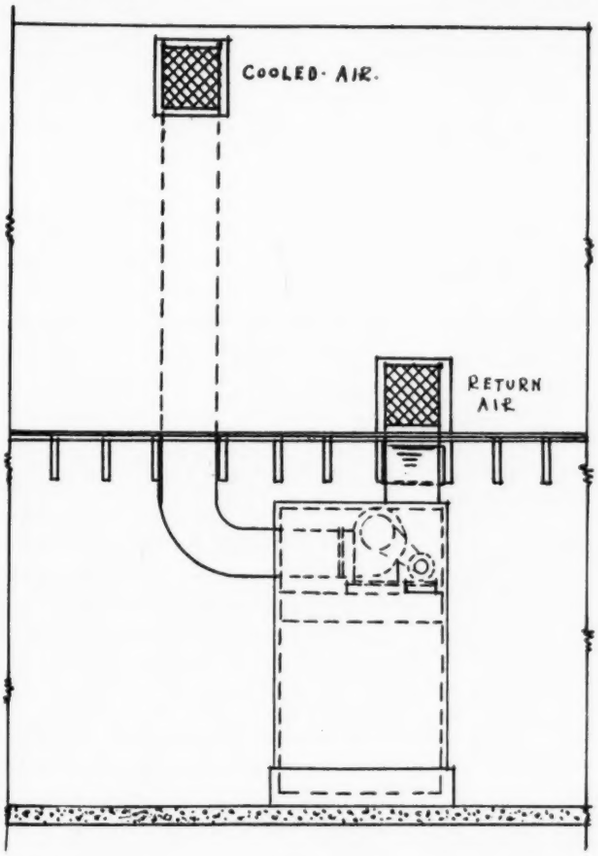
Cost of Operation

Wholesale rates are obtainable in most localities, for ice in quantities of 300-lbs. and over. The rate in this case was fixed at 35c per hundred. The cost of ice per day varied from $1.05 to $2.10. An average cost may be assumed at $1.60 per day.

Electric power cost, for pump and motor, may be assumed at 3½c per hour. Total cost of cooling average per day, $1.95. (Ten hour period).



This elevation shows the location of the furnace, fan, ice chamber and cooling unit. Ice melts in the chamber and ice water is forced through spray heads in the cooling unit. Air is passed through the ice water spray and not over the ice. The unit is used "as is" in winter for heating



This drawing shows a more compact cooling unit in which the ice chamber, fan, filters and controls are all housed in one casing. This type of cooler makes an excellent product to sell owners of steam and hot water heated houses. As many rooms as wanted can be cooled. The unit can also be hooked up to a furnace for forced air heating with filtering, washing and humidifying

So many factors enter into Cooling that the cost is bound to vary. These are:

(A) The locality.

(B) The construction of the building. Whether insulated or uninsulated.

(C) The outside temperature.

(D) The opening and closing of doors.

(E) The number of people in the home.

(F) The number of windows and sun effect.

(G) Electric Light used.

(H) Heat from kitchen cooking.

Design

This article has shown how heating and cooling with "Conditioned Air" has been applied to a residence originally heated with gravity warm air.

The problem in new homes is less than in buildings already erected, because the engineer can collaborate with the architect and produce an efficient and economical plant.

The reader may wonder if cooling apparatus can only be added to homes provided with a warm air system of heating. We hasten to present the assurance that cooling can be made a feature of homes, regardless of what type of heating system is employed, as witness the illustration showing the unit shown to the left, which in one complete unit of apparatus combines an ice charged air cooler, a motor pump set, and a fan-motor set. It is only necessary to install supply and return air ducts and grilles to the selected rooms and a complete cooling system entirely independent of the heating is the result.

The temperature of 95-deg. or over did not extend beyond twenty-five to thirty days in our locality, during the past summer. Thus, during one of the hottest years experienced, the actual investment for ice was less than $60.00. The investment for cooling equipment would vary with the type of cooler installed, but proved less for the ice charged cooler than for mechanical refrigeration. Where to draw the line will probably depend on climate.

Conclusions

It is apparent from the description of the "Air Conditioning" System in this residence that all of the fundamental factors, today generally recognized as requisite to comfort for both summer and winter, are features of this system.

It is safe to say that any fair minded person would be amazed at the fine exhilarating conditions obtainable in winter, and the great relief afforded in summer.

It is only a question of time before people will *demand* like comfort producing systems in their houses. The word is constantly spreading and an increasing number of installations is being made every year.

Cooling of homes, especially with low-priced apparatus is bound to be a much discussed topic this coming summer. This article answers by practical experience many of the questions you will be called upon to discuss if you intend to enter this field in your community. The editors feel sure that Mr. Kitchen will be pleased to answer any questions you have or to amplify any points which are not clearly covered in this description.

What is PROFIT?

By
JOSEPH G. DINGLE
C. P. A.

DURING 1930 we presented a series of articles outlining and explaining the detailed methods of installing an adequate, yet simple, set of books, the keeping of such records, and the preparation of operating statements therefrom. We published illustrations of the several printed and ruled forms and explained their purposes and the various steps in compiling the cost data thereon. We printed a small supply of these forms and offered to supply them to the readers of the ARTISAN in quantity suitable for a small shop. We are happy to report that shops in California, Minnesota, Wisconsin, Ohio and Illinois have availed themselves of this offer and, we hope, have profited thereby.

Interest in Bookkeeping

One of the most gratifying results of these articles has been the many letters we have received from sheet metal shop men all over the United States. I believe we have had letters from practically every state in the Union. They have apparently become interested in better cost records and, we have been using some of these letters as foundations for articles, thus giving to ARTISAN readers the benefit of the discussions of particular questions.

Some days ago, we received an inquiry from a Chicago reader asking the following question:

"In the light of 'Have You Raised Your Percentage of Profit for 1932' in the ARTISAN of February 29, 1932, in which you figure profit on Cost, please read the article "Adding 20% to the Cost does not mean 20% Profit" in the ARTISAN of July 5, 1930. Which method is correct?"

Before proceeding to the answer to this reader's question, we want to extend our compliments. First: his question is extremely well put; again, he proves that he is not only a careful reader, but that after reading pages he files them for future use. His reference to a short, but highly valuable table, published on page 36 of the ARTISAN of July 5, 1930, almost two years old, shows very clearly that he does more than subscribe to a Trade Journal. He is the type of subscriber every publication appreciates. He is getting something for his money, and, using that something in his business.

Table Showing the Percent to Be Added to Cost to Obtain Any Desired Percentage of Profit

Add % to Cost	To Make % Profit on Sales	Add % to Cost	To Make % Profit on Sales
1	0.99	26	20.63
2	1.96	27	21.26
3	2.91	28	21.88
4	3.85	29	22.48
5	4.76	30	23.08
6	5.66	31	23.66
7	6.54	32	24.24
8	7.41	33	24.81
9	8.27	33⅓	25.00
10	9.09	34	25.37
11	9.91	35	25.93
12	10.71	36	26.47
12½	11.11	37	27.01
13	11.50	37½	27.27
14	12.28	38	27.54
15	13.04	39	28.06
16	13.79	40	28.57
16⅔	14.29	41	29.08
17	14.53	42	29.58
18	15.25	43	30.07
19	15.97	44	30.56
20	16.67	45	31.03
21	17.36	46	31.51
22	18.03	47	31.97
23	18.70	48	32.43
24	19.35	49	32.88
25	20.00	50	33⅓

The percentage of profit should always be figured on the selling price and not the cost.

We have taken the liberty of restating this reader's question, changing it from WHICH IS CORRECT? to WHAT IS PROFIT? This for the reason that the article published February 29th, 1932, discussed PROFIT and the earlier article included a table showing the percentage to be added to cost to produce any desired profit on sales. For the benefit of our readers who have not preserved their ARTISANS of two years ago, we reprint that table. It is worthy of being framed and given a place of honor in every sheet metal contractor's office.

Profit Defined

Before going into an answer to the question WHAT IS PROFIT? let's get our bearings. The sheet metal contractor is a contractor and also a manufacturer. He contracts to deliver and install a manufactured product for a certain consideration, or price. He, unlike an automobile manufacturer, rarely builds the same thing twice. He will, of course, install many furnaces, and while the furnaces may be identical, except for size, the installation varies greatly with each job. The sheet metal contractor cannot sit down at the beginning of a season and compute his selling price on each size furnace. He must measure each job separately, using the Standard Code; obtain his furnace requirement from the results of his measurements; compute the materials required for his pipes, and the number and styles of his registers. In short, he must determine the amount of material required. Having determined the re-

quired materials, they must be priced, at cost. This we will call Step No. 1.

The next point is to estimate, at cost, the amount of direct labor required to process the material and install the job. This is Step No. 2, and we now have built the foundation for pricing the job. This foundation, like the foundation for a skyscraper, governs the success of the venture. If built carefully and accurately, the finished results will be quite satisfactory. If carelessly or loosely constructed, the job will never be satisfactory. A poor foundation for a building makes a poor building; but a poor foundation for a job price may lose the job because the price is too high, or you may lose money because your "price foundation" did not properly include the required quantities of material and sufficient direct labor to properly process and install the material. This Step No. 2, which represents our "Price Foundation" is called PRIME COST.

Step Number One

In illustrating this article, I have used squares—of equal size—a condition that rarely prevails in actual cost records. These squares, regardless of this fact, will well illustrate the point. Note if you will, that I have placed a heavy black line around the squares representing Material and Direct Labor. This to

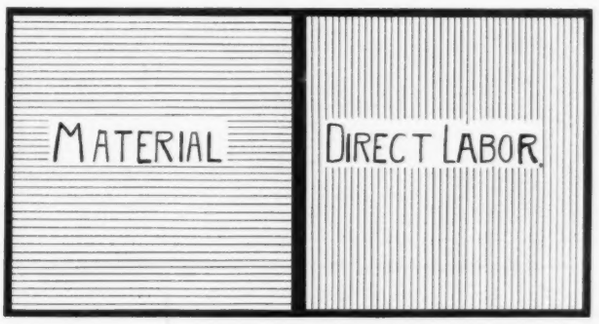
STEP No 1.

further emphasize the FOUNDATION feature of MATERIAL and DIRECT LABOR.

Having thus prepared our foundation, we are now ready to proceed further. Our Step No. 3 shows a new square placed upon our foundation. This square represents OVERHEAD, and in order to

Prime Cost consists of two items —direct labor and material. Regardless of where you place Overhead you should remember to account for these two items, otherwise your price will be too low. Material and Direct Labor are the foundation stones of price building

PRIME COST.



STEP No 2.

show its separateness from our FOUNDATION elements, we place around it a border of open lines. These three steps completed, we have our COST. We must know the Cost before we can compute the selling price. Cost plus Profit equals Selling Price.

We can, therefore, state that *Profit is the difference between Cost and selling Price.* But, you will rightly say that does not answer the question asked. We agree with you. Our reader wants to know whether profit is a *percentage of the cost,* as used in the article in the February 29th, 1932 ARTISAN, or a *percentage of the sales price,* as is stated in the article of July 5, 1930. The answer to this question is that PROFIT IS BOTH A PERCENTAGE OF COST AND A PERCENTAGE OF SELLING PRICE. This may sound queer, but when thoroughly understood, it is very simple. In an attempt to bring to you a clear picture of profit, both as a percentage of cost and of selling price, we have given you Steps 1, 2, and 3, as illustrations.

You cannot quote a selling price on a job until you know the cost of the job. Or, you must FIRST estimate the cost of the job—including Material, Direct Labor *and* Overhead. Step No. 2 shows two squares, representing Material and Direct Labor—which constitute Prime Cost. This illustration is a true rectangle and has a completed appearance. It is a completed unit, being the foundation or base upon which we are prepared to build. Step No. 3 shows a new square placed upon our base. This third square represents our Overhead. Step No. 3 is an incomplete structure. It has, like Step No. 2 a good base, in fact, the same base, but Overhead stands upon this base alone. We call this incomplete structure "Cost." Step No. 4 is Step No. 3 completed—squared out, by the addition of the fourth square, representing Profit. This is a completed structure, and viewed from any angle presents the four components of a selling price, namely Material, Direct Labor, Overhead and Profit.

Ascertaining Profit

Now, having set up our illustrations, we can proceed to prove our statement that profit is both a percentage of Cost and of Selling Price. We will use, first, Step No. 3, which represents Cost. It is an incomplete and irregular design. To complete the design we add, in Step No. 4, the square representing Profit, and by so doing we produce a perfect square, composed of four

STEP NO 3.

Material and Labor for a given job may be nearly the same for a number of shops, but the third stone — Overhead — seldom is the same for two shops. When you have added together Labor, Material and Overhead you have your cost

equal squares. Then Profit is one-third, or 33⅓% of our cost. But, in looking at the perfect square (Step 4) we find Profit represented by one of four squares. Profit, then, is only one-fourth, or 25% of Selling price.

Profit then, in our illustrations, is 33⅓% of our Cost, and, at the same time, is only 25% of our Selling Price.

We could carry this further and say that, in these illustrations, profit is equal to 100% of either Material, Labor or Overhead. Also it is equal to 50% of any two of the three elements of Cost. But, in practice, the four component parts of a Selling Price rarely are of equal value, and, further, we must put Material and Labor together to produce a foundation on which to build the selling price. Either figure, alone, is worthless. It is

The last stone to be added to your price making is profit. Too often this is forgotten in the desire to get business. Just what profit is and how you determine it are fully explained in the article. Compare the article with your own methods

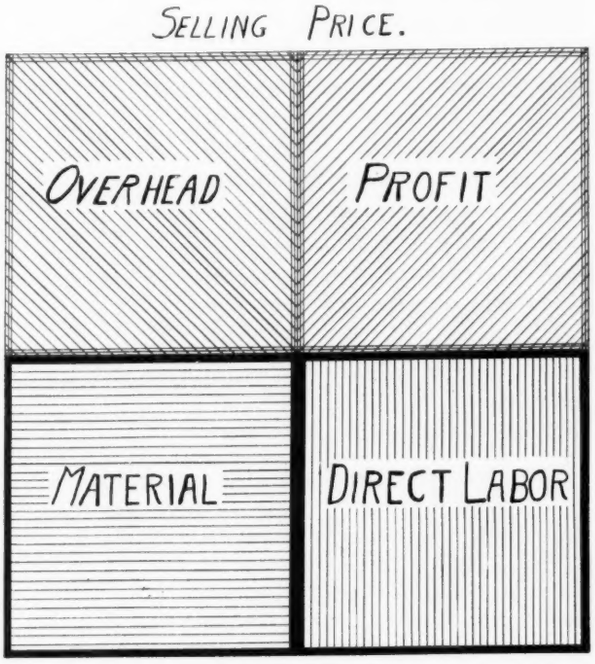
the sum of the three (Step No. 3) which produces Cost, to which we add the fourth element—PROFIT —to arrive at our Selling Price. By the use of the table reprinted here, you can instantly determine the percentage to be added to Cost to produce any desired Profit in Selling Price from 0.99% to 33⅓%.

For instance, assume you wish to obtain 20% profit in Selling Price. Refer to the table, column headed "To Make % Profit on Sales" and opposite 20 you will find 25. To your cost add 25% and you will have 20% profit in your Selling Price.

Without this table, you must use the following formula:

Selling Price	**100.00%**
Profit in Selling Price	**20.00%**
Balance equals Cost	**80.00%**

Then:



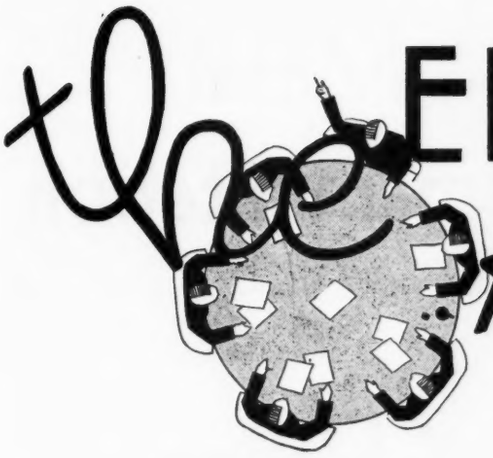
STEP NO 4.

Cost divided by 80 and multiplied by 100 equals Selling Price.

The use of the table is much easier.

Adding 20% to Cost Does Not Mean 20% Profit. It does, however, mean 20% PROFIT ON COST — and ONLY 16.67% PROFIT IN SELLING PRICE.

This article is based on an address presented by Mr. Dingle at the 1932 Illinois Sheet Metal Association convention. The illustrations were chosen because they show clearly how building a price is a matter of piling on blocks. If you have any questions write Mr. Dingle in care of American Artisan or direct at Ottawa, Illinois.



The EDITOR'S Roundtable

Should We Correct Factor 55?

WE published in the March 28 issue a question submitted by B. L. Schwartz, heating contractor of Pittsburgh. Mr. Schwartz asked why should Factor 55 continue to be used.

Another very interesting letter replying to this discussion comes from B. J. John, heating contractor in Philadelphia. Mr. John says—

"It is not strange that men like Mr. Schwartz, who have earnestly studied and practiced the best in air conditioning, would endeavor to perfect their methods by applying engineering data differently than that which has already been established. This makes for progress.

"Yet the fine engineers who have thus far led us out of the old 'hot air' game must have reasoned that it would be sometime before we would approach perfection in this new field, and that the general engineering data they suggested, should be simple and cover the field as we understood it, hence the factor '55' was based on room temperature. Relative humidity, they felt, could take care of itself for the time being.

"I believe the factor '55' is correct in practice so far, at least it has proven to be so, when we base our conclusions on bodily comfort of the occupant, rather than on 70 or 135 degrees and 45 per cent relative humidity, which is not a fact in the average dwelling during even the greater part of the heating season.

"When the subject of relative humidity was stressed several years ago for fan systems, we sought to help the system by obtaining a certain percentage of relative humidity at 68 and 70 degrees room temperature. We found in a number of instances that it varied as much as 10 per cent, depending on the outside temperature, the infiltration and the will of the owner as to the degree he wanted the thermostat.

"The tests then taken were based on register and room temperature, relative humidity, velocity at the register and volume. Today tests are based on all these without relative humidity, simply confining data to certain readings as shown in the Comfort Zone.

"The perfectly square dwelling with 22-inch stone walls; 8-inch partitions, with semi-gravity ventilation to outside from hallways; bath and kitchen and weather stripped, does afford an opportunity to a near approach to this balance, because of the ease of heating. However, the wing or L-shaped dwelling, with six to fifteen branches from one main duct to varied sized rooms, gives a very different result in different rooms at low temperatures. When we remember that most of these systems are being installed in old dwellings where the heating contractor has but little control over the infiltration and temperature range desired, it is apparent that the perfect balance cannot yet be obtained.

"I don't believe we have yet mastered the air motion in ducts and branches sufficiently, nor are able to apply moisture to the correct amount to suit all rooms to be much worried between the so-called dry air, which does not exist, although much improvement has been made even in this direction.

"Had we not better have ducts a little large, than make them too small and suffer the penalty of enlarging afterward or stopping air noises and using too high speed that promotes warm air drafts?

"It is interesting to note that a better average relative humidity per cent can be obtained through a fan system with individual room leaders, all taken from the heating unit.

"We had better stick to factor '55' until many more men understand it and apply it. Then we can have a fine time making the engineers, on whom we have depended so far, tell us the rest of the story, for there is much more and they know it."

The primary purpose of this page is to give readers an opportunity to air their views on subjects which they feel the industry ought to standardise. Technical subjects will, naturally, occur most frequently, but practical subjects will be just as acceptable. We should like to have you make use of this page either under your signature or anonymously, as you prefer.

Metal Ornamentation on a Chicago Restaurant

The exterior is metal and marble in contrasting colors

THERE is in Chicago a chain of restaurants, known as the Triangle group, which have, under the leadership of D. L. Tofenetti, owner, established a national reputation for doing the unusual.

From the very beginning these restaurants have been known for the excellence of the food served and also for the unique advertising used to publicise the company's special dishes.

Two principles have been followed in building the group from a single restaurant established some sixteen years ago to one of the best known cuisines in the city—good food uniquely advertised and patron comfort.

This idea of patron comfort has been developed from years of experience. While the company realizes that what may spell comfort for one person may not be comfort to another, they also know that there are certain basic principles underlying all comfort. In a restaurant these basic principles are sanitation, good food, eye appeal and good air.

Of these four principles the first two are pretty generally used by all restaurants, but good air and eye appeal are features which have been overlooked and are only now being used to build business.

No better illustration of how good air can be capitalized can be cited than a description of the newest Triangle restaurant opened last winter in the theatre district. This newest restaurant is, at the same time, a striking example of how metal craftsmanship can be used to furnish eye appeal and make the interior outstanding in beauty and distinctiveness.

The design of this remarkable eating establishment is the work of Joseph G. Ludgin, Chicago architect with Walter McDougall, engineer.

In this restaurant the sheet metal fabricator and the air conditioning engineer have plied their skill and artisanship to effect an eating place already lauded all over the country.

Throughout the interior, metal in various forms and of different materials has been used lavishly. On the outside the dominating feature is metal—not only for ornamentation, but for service.

The exterior has a facing of black granite upon which is superimposed aluminum ornamentation and facings for the spandrels, doors, windows and trim. Metal frames the doors and the windows of the first two floors. This metal is cast aluminum finished in both sand blast and polished surfacing.

On the front the sills of the first floor windows and the sash and the transoms of both first and second floor windows are extruded aluminum sheet in a polished finish.

On the third floor the spandrels are cast aluminum, highly ornamented with both polished and sand blast finishes.

On the inside the use of metal has been carried even farther. Around the walls of the first floor are large mirrors held in metal bands formed of Enduro metal given a satin finish. The ceiling molding is ornamented with narrow bands of the same metal, emphasized by table and counter trim in harmonizing finishes of Allegheny metal. Across the kitchen service counter there is a wide arch trimmed in rolled bands of metal polished to reflect the lights of the dining room.

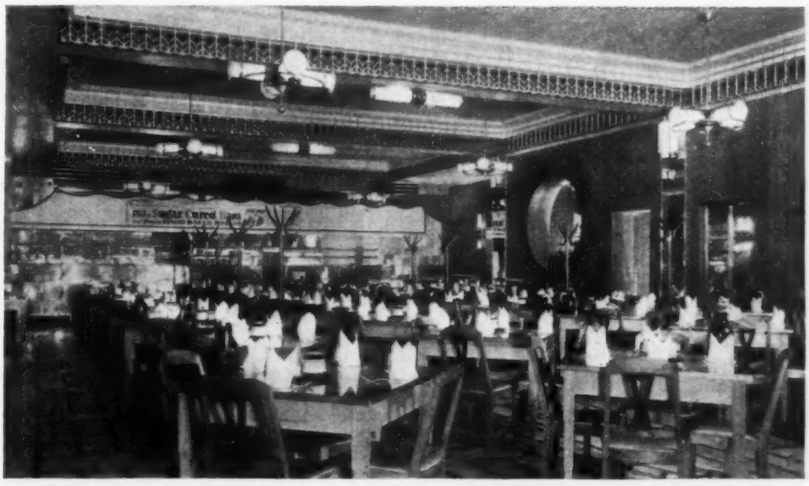
The doors of the elevators are also finished in Enduro and ornamented with polished panels of the same metal. The stair railing, the door grilles and bands around ventilating grilles are also finished in polished metal.

This extensive use of metal is also used on the second floor dining room, where mirrors, windows, ornamental panels, moldings and room trim are all metal, some polished and some sand blast.

The metal of both these dining rooms is set off by modernistic lighting fixtures which are a combination of Formica, opal glass and polished aluminum. The general design of all fixtures is the same—glass cylinders held in metal bands. Special metal is even used for the coat hooks.

In the service quarters metal is used everywhere. Work and service tables, cabinets, shelves are metal mostly Allegheny.

This elaborate use of metal for decorative purposes serves to make the restaurant unusual and modernistic in appearance, but a hidden service, namely, air conditioning, is used to keep patrons comfortable. An elaborate air conditioning system, designed and installed by Carrier Engineering Corp., supplies warmed, cooled, washed, cleaned air all the year through. This system is counted upon to keep patrons comfortable on the hottest, most humid, days of summer. The system is all indirect with the exhaust and supply grilles worked into the decorative scheme of the two floors and all mechanical work hidden behind plaster and metal.



Throughout the second floor dining room, metal in various materials and finishes is used as ornamentation. The designs and color contrasts are strictly modern. In this photograph the ceiling moldings, doors and door trim, lighting fixtures, service counter at the rear are either all metal or have metal trim

This use of modernistic metal was not adopted without good reason, the reason being that distinctiveness is steadily becoming a highly important factor in building business. For the transient guest, uniqueness serves to picture the interior permanently in the mind and secure word of mouth advertising, while the steady customer always finds something new and interesting in Triangle's interior decorations.

When this eye appeal is joined to twelve month comfort, supplied by heating and cooling systems which the warm air furnace and allied industries can supply, the problem of business building is half solved.

The first floor dining room depends upon metal for color contrast and upon air conditioning for patron comfort. Metal forms the ceiling trim and mold, counter trim, service counter and mirror panels

A Cleaning Campaign —for Profit!

WE referred briefly to the use of another type of direct mail literature—namely, the mailing piece which is designed to attract attention and sell the service without reliance upon an immediate follow up call. Such a mailing piece must be designed for somewhat different conditions.

To outline such a mailing piece we may say that the folder shall—

1. Attract attention through ingenious design, striking slogan, use of color.

2. It should tell all about the savings assured through having a clean furnace. Such savings should be illustrated if possible so that the owner cannot miss this point.

3. The reading matter should tell completely the history of the special service, either through bold catch lines or through plainly worded sentences.

4. The mailing piece should be designed with a return card which the owner can fill in, either asking a representative to call in person or on the phone. There should also be an invitation to call your office for further particulars.

5. The mailing piece should also leave the way open for a second mailing effort or give some excuse for you to call the owner on the phone.

6. One of the most important things such a piece of literature should do is—GET THE OWNER TO USE THE SERVICE RIGHT NOW. This can be accomplished by offering a special price within a time limit.

There are in successful use today, an endless number of different types of such literature. Some of the mailing pieces are quite elaborate, some are very brief and plain. Both have been found successful. Just which type you will select will depend largely upon two things—1—how much money you want to spend on this type of advertising, and 2—what sort of similar literature other contractors in your area are using.

We have said that direct mail literature must attract attention. What are the ways this can be accomplished? Remember that the average household today receives from one to a dozen pieces of direct mail every day. All sorts of services and products are offered by mail so your mailing piece must compete directly with all these other services which seek to get a part of the home owner's dollar.

YOUR LETTERHEAD

My dear Mrs. Smith:

Economy in the necessary expenses of the home means savings that may be applied toward the little luxuries that make life so much more pleasant.

Take the fuel bill, for example. There are a number of things you would like to have for yourself, or for the house, or for your children. Some of these things may be bought out of the savings you can achieve in the cost of heating your home next winter.

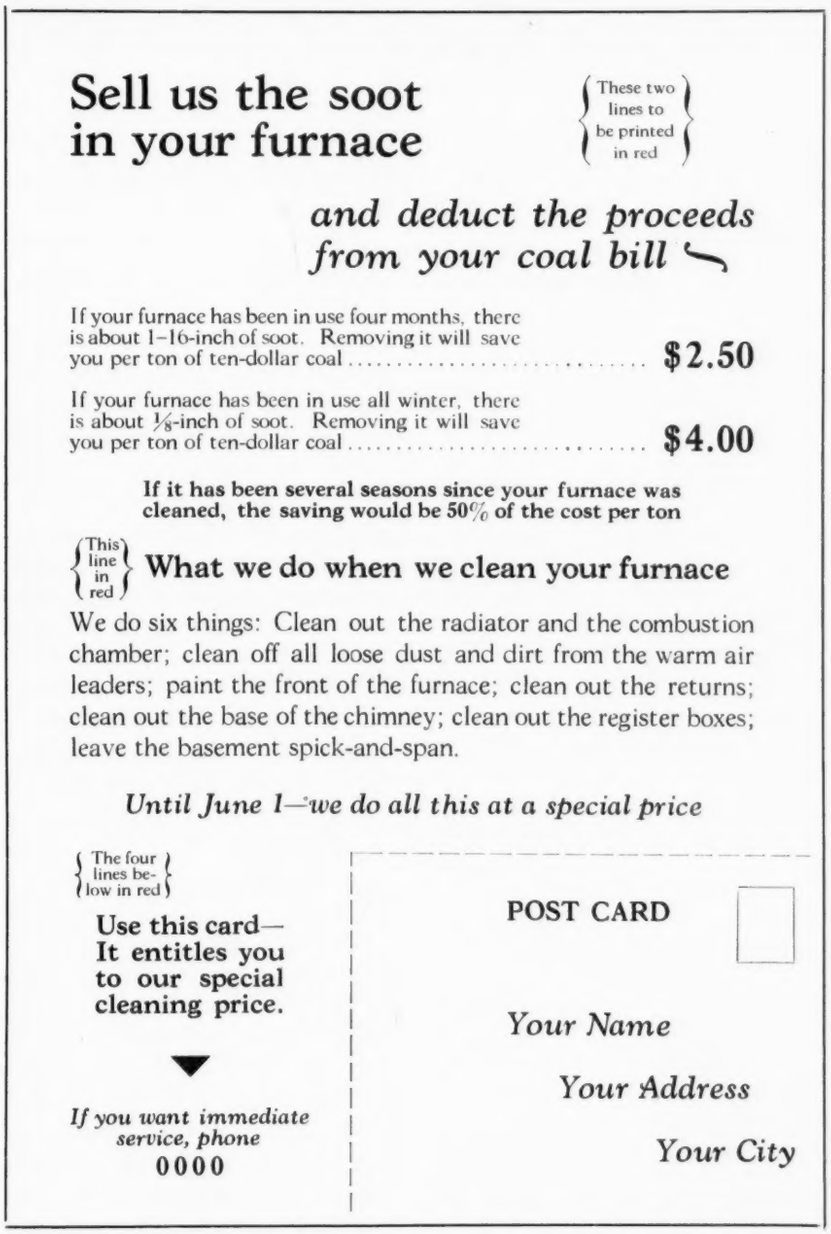
Here's how: By having your furnace cleaned now. You can see how the soot from the fuel gradually gathers in the furnace. Soon it is like a fluffy, down blanket, keeping the heat from the fire from warming the air for the rooms in which you live. And in order to keep the living rooms sufficiently warm, you have to burn more fuel and force your fire more often.

Just now--and until June 1--we are making a special offer to clean your furnace at an attractive price. You will name the time when it will be convenient to have the job done, and we'll schedule the work for that time. We'll clean the inside of the furnace, the register boxes and the smoke pipe. The result will be an economy in fuel--and a further economy in cleaning bills for curtains, drapes, etc., because we will remove the dust from back of the registers and in the cold air returns.

Keep this letter--it entitles you to the special cleaning price--and 'phone now, so you will be sure of being able to select a time entirely convenient to you.

Your Signature

Letters personally addressed always get attention denied direct mail. Therefore, any letters you send out should have the personal touch which ties you to the receiver. This letter is typical of this personal appeal.


Sell us the soot in your furnace
These two lines to be printed in red
and deduct the proceeds from your coal bill
If your furnace has been in use four months, there is about 1-16-inch of soot. Removing it will save you per ton of ten-dollar coal $2.50
If your furnace has been in use all winter, there is about ⅛-inch of soot. Removing it will save you per ton of ten-dollar coal $4.00
If it has been several seasons since your furnace was cleaned, the saving would be 50% of the cost per ton
This line in red
What we do when we clean your furnace
We do six things: Clean out the radiator and the combustion chamber; clean off all loose dust and dirt from the warm air leaders; paint the front of the furnace; clean out the returns; clean out the base of the chimney; clean out the register boxes; leave the basement spick-and-span.
Until June 1—we do all this at a special price
The four lines below in red
Use this card—It entitles you to our special cleaning price.
If you want immediate service, phone
0000
POST CARD
Your Name
Your Address
Your City

Direct mail cards must do two things—make the receiver read them and get the receiver to act immediately. This mailing piece bases its appeal on the slogan, which is unusual. Color should be used as indicated. This mailing piece has a return card for action. The folder should be about 7 by 10 inches in size

Attention is gained through several methods.

First let us consider a type of mailing piece known as a "Giant" folder. The purpose of this huge sheet is obvious—to gain attention mainly through its large size which cannot help but get attention when the receiver opens the piece. The cost of such a mailing piece is, naturally, higher than a similar, but smaller, size. However, rightly designed and worded such a folder gains attention which cannot be secured with a similar small piece.

Color is another, and much used, device to gain attention. There is no denying that the use of color snaps up a piece of direct mail and since this device is popular, your literature must compete with literature of firms which use color lavishly. It would be well to consider color and call in a local printer to quote prices on quantities you can use.

Use of Color

The colored slogan is another device quite popular. Usually this type of mailing piece comes folded two or three times. On one of the two outside folds is the mailing address and on the other is a catch line which intrigues the receiver to open the mailing piece to find out what this catch line is all about. Curiosity is the motive which gets such literature opened and read.

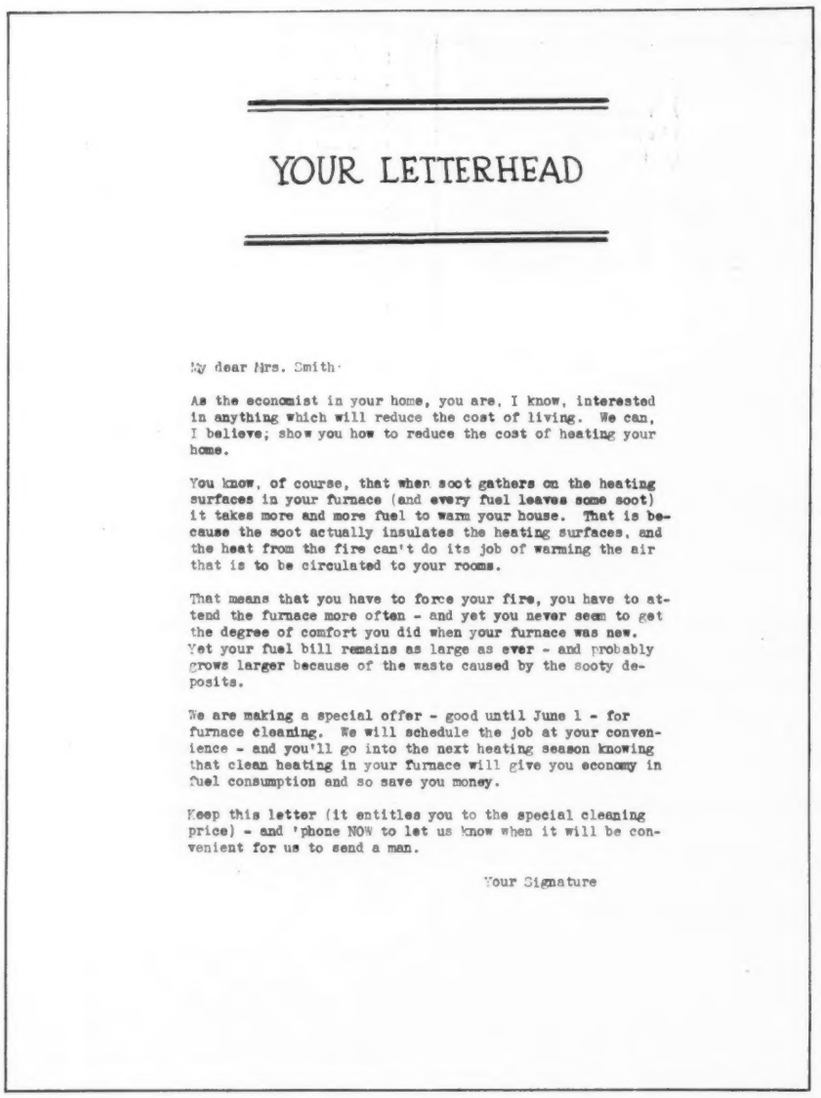
General design covers a wide field of application. One contractor prepared an elaborate mailing piece in which several pages were progressively cut short in width and on each of these tabs a catch line and small illustration were used to arouse curiosity and get the receiver to open the piece and read its message. It is obviously impossible to show samples of all such mailing pieces, and furthermore, readers are no doubt familiar with the material used in their area.

Artisan Return Card

As a part of AMERICAN ARTISAN'S service we show one style of mailing piece which has been compounded from various mailing pieces used successfully by contractors in different parts of the country.

The prime motive, if such phraseology may be used, is unusualness. Remember that whatever you mail out must compete for attention and action with dozens of other similar efforts from all sorts of companies, offering all sorts of services and

This is the reverse side of the mailing piece. There is the catch line, mailing address and return card



YOUR LETTERHEAD

My dear Mrs. Smith:

As the economist in your home, you are, I know, interested in anything which will reduce the cost of living. We can, I believe, show you how to reduce the cost of heating your home.

You know, of course, that when soot gathers on the heating surfaces in your furnace (and every fuel leaves some soot) it takes more and more fuel to warm your house. That is because the soot actually insulates the heating surfaces, and the heat from the fire can't do its job of warming the air that is to be circulated to your rooms.

That means that you have to force your fire, you have to attend the furnace more often - and yet you never seem to get the degree of comfort you did when your furnace was new. Yet your fuel bill remains as large as ever - and probably grows larger because of the waste caused by the sooty deposits.

We are making a special offer - good until June 1 - for furnace cleaning. We will schedule the job at your convenience - and you'll go into the next heating season knowing that clean heating in your furnace will give you economy in fuel consumption and so save you money.

Keep this letter (it entitles you to the special cleaning price) - and 'phone NOW to let us know when it will be convenient for us to send a man.

Your Signature

Here is shown another letter, not quite so personal in appeal. It is couched in terms to attract every home owner who wants to save money—and that means practically everyone these days. Note that there are no terms used which cannot be understood by anyone. Action appeal is through a request for a phone call

products and that the service which gets the home owner's dollar will be that service which makes the strongest appeal—usually in terms of pleasure afforded or benefit rendered.

Also remember—MONEY TALKS.

That must be the underlying motive behind all your efforts. YOU CAN SAVE THE HOME OWNER MONEY—but you will have to sell this saving.

In this article we give copy for two letters. In these letters we play up the point just made—the fact that you can save the home owner money by cleaning the furnace now. The value of the letter is, of course, that it is a more personal message than a circular. Unless the mailing list is very large, it should be possible to have the office girl type each of the letters so that they bear every sign of the personal letter.

There is hardly a housewife who does not desire something for herself, her home, or her children, and usually in the reverse order to that in which we have stated these things. So, the first letter has a strength of appeal peculiar to the woman who cares much for her home and her family. The second letter is more closely concerned with the idea of economy, of saving in the fuel bill, leaving the housewife to visualize what savings might mean to her in the way of added comforts or convenience.

There is one very important matter which should be touched on here. Let us assume that a dealer has made use of the circular and of one, or both, letters. If his mailing list is a good one, he will have returns.

WHAT HE DOES WITH THOSE RETURNS IS IMPORTANT!

Many a good advertising campaign is spoiled by the handling of inquiries. The dealer who receives a number of return cards from the circular, and a number of telephone calls from the letters, must be prepared to handle those inquiries promptly and efficiently. He must be prepared to make, at the convenience of the customer, the personal call which may be necessary to close the sale. And if he has promised that his man will be at one of those houses at a given time to perform the work, his promise must be kept at all costs.

Consider the Appeal

We urge a close study of the circular and the two sales letters. We believe the circular possesses an unusual appeal, and while we do not insist that it is the last word for such a circular, its fundamental idea, and the logic with which the idea is developed, are correct. Change it, by all means, if you have the knack of writing copy. In any case, the selling approach used in each case is worthy of study, either for use as the material appears in these pages, or for building into any other advertising literature you may have in preparation.

One more thing—for your own information keep a record of returns. We'd like to have such information from users of this—or any other—sales material, because it is enlightening to set against the cost of an advertising effort and the type of appeal used the actual results in number of sales, and in dollar-value of those sales. If, out of these calls for cleaning jobs there come sales of repair parts or of new furnaces, such sales should be credited to the effort.

OVERHEAD FURNACE SPEEDS BOTTLE LABEL DRYING

A WARM air, gas-fired; overhead furnace in the bottling room of the Dorado Club Beverage Company, Los Angeles, has saved the company hundreds of dollars in the last eighteen months, has given a condition that has allowed the management to reduce the working force by three people, and is doing the work of drying labels on bottles satisfactorily, almost instantaneously, according to F. F. Haman, superintendent at the plant.

Prior to the installation of this furnace, the labels after being pasted to the bottles dried slowly under average and normal atmospheric conditions. They could not be packed immediately into cases and had to be handled by someone and placed some place to dry. That kind of a process took time and required labor.

General Design

Under the plan worked out by Mr. Haman and The Hayes Furnace Company of Los Angeles, a gas-fired unit has been suspended from the beams overhead. A fan-driven motor has been installed so that air passage is reversed and the air is forced into the heating chambers of the furnace from above. There are three leader outlets, each one a four-inch galvanized iron pipe. These come down to the bench working-level and tap into a sheet metal jacket which surrounds a traveling, endless chain conveyor. The bottles with the new and damp labels upon them pass along in a standing position on the conveyor. As they pass through the jacket they are subjected to the currents of warm air and by the time they have made the trip through the heated tunnel the labels are perfectly dry and the traveling carrier takes them on to the working area, where they are packed in cases. There is no delay in the bottling and packing process.

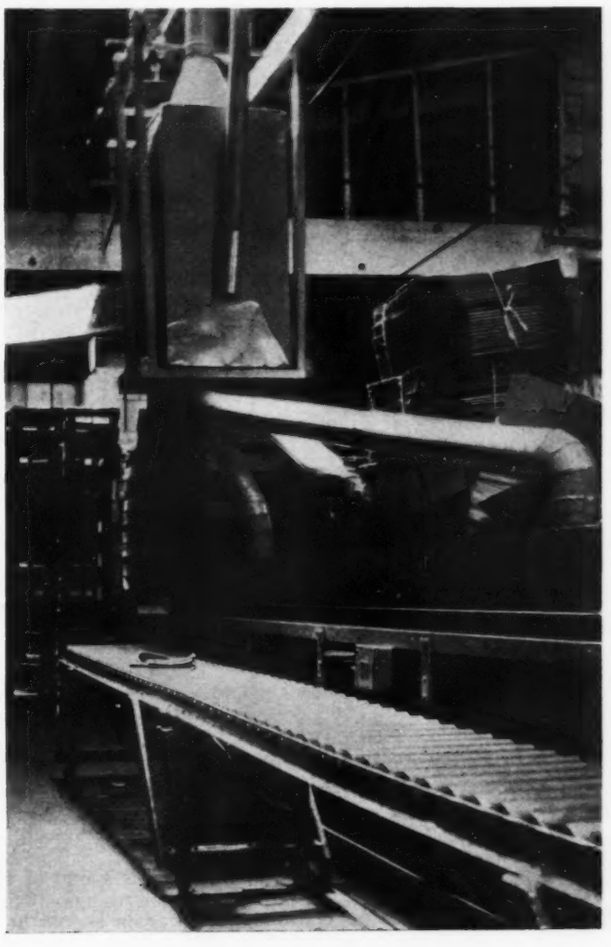
"The cost of this first installation was larger than the cost of a second one would be," says Mr. Haman, "because I had to have blue-prints and patterns made, and had to study out the details. It cost us all told about four hundred and fifty dollars, but it has saved us that amount several times over. I do not think a second installation, should we need it, would cost more than half of that. We have the plans on hand now with all the kinks worked out.

"It should be noted that the tunnel through which the bottles travel is larger at one end than at the other. This is for the purpose of equalization of heat.

"The cost of operating this system is small. The amount of gas burned is not large and the amount of current consumed by the small motor is inconsequential—yet thousands of bottles per day pass along the channel.

"The overhead feature puts the furnace up away from needed floor space and where only a short vent is required. During chill weather the heat shot down below the breathing line is welcomed by the working force."

This unique installation represents another good use for warm air equipment."



The gas fired furnace was hung from the ceiling and with air flow through the casing reversed. A fan blows the air downward through the casing and through leaders to the conveyor housing

FAN BLAST ENGINEERING

by PLATTE OVERTON
ENGINEERING EDITOR . . . .

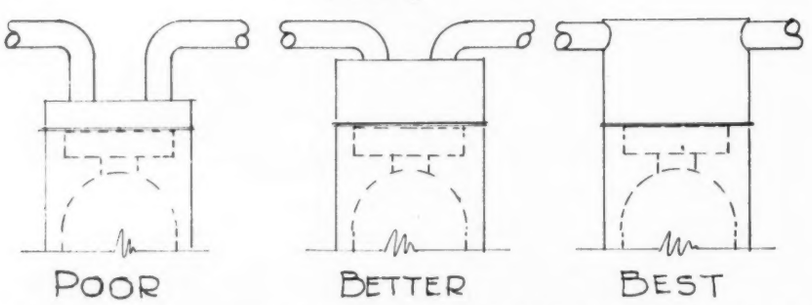
Bonnets and Plenums

IN the last issue we discussed Branch Takeoffs. Equally important are the takeoffs at the heater which we will term our bonnet leads. In this connection the word "plenum" has come into popular favor, although many contractors do not know what constitutes a plenum. This article will attempt to show some of the common practices and judge them according to engineering practice.

Under the discussion of plenum chambers and their design, we hope to start an extended controversy. Surely no designer of air conditioning units would leave the supply connection at the top of the unit to conjecture. He had some reason for designing the hood and connection as shown in his diagrams and drawings or he does not deserve the title of designer.

We have attempted in the recent articles by Platte Overton to discuss the many features of design and fabrication which enter into the everyday engineering of forced air heating systems. Many contractors have written to ask what constitutes good and bad practice at the point where mains come off the heater. This article should answer these questions. If you want more information write to Mr. Overton.

FIG 5



Here are shown three common types of bonnets adjudged according to the efficiency shown in the leaders. The bonnet marked "best" is so judged because pressures at leader entrances will be more nearly equal all around the hood than in other two. Equal pressure is what is wanted

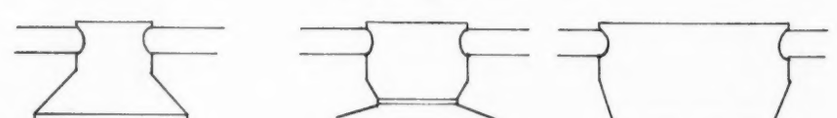
However, the many and variable designs now observed, some of them weird indeed, raises the question of which is correct. The word "plenum," I believe, is Latin for "full," hence a plenum chamber is a full chamber. It is not a storage space, in the writer's judgment, but a space to equalize velocities, pressures, and "shocks" and to distribute, as it were, the air to the various runs or leads equally or in proportion to their needs. It should minimize entrance losses and offer as few sharp corners as possible to air flow.

Primarily, the writer believes that a plenum chamber should be as large as possible within practical limits. The accompanying sketches are of various types of plenum chambers or casing hoods now in vogue in "forced air" work or mechanical systems. (Figs. 5, 6, 7.) The writer can offer no charts, diagrams or laboratory tests to support the decisions given for each design. They are founded on experience and observation alone, hence not infallible.

The designs marked "best" are the ones the writer would use for the design. The design "better" in Fig. 7, if so designed to maintain "static" in place of "velocity" in the heater casing to eliminate housing should in this case be termed best.

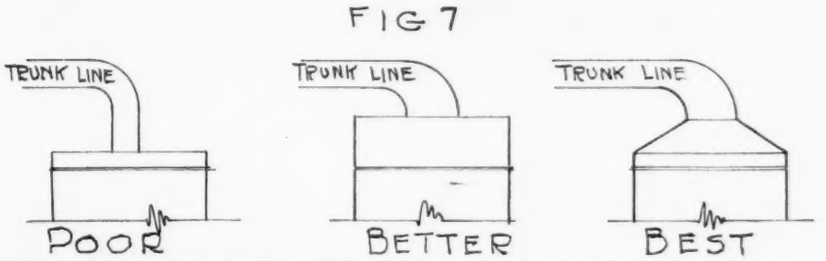
Housing gravity units to convert them to mechanical units leaves much information to be desired.

FIG 6



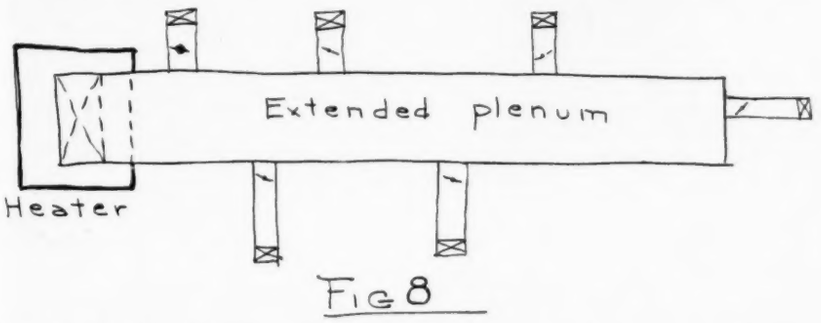
This group of three takeoffs shows some freaks for which their owners claimed big things. The value of the one marked "best" lies in the fact that pressure again should be more nearly equal all around the bonnet than in the other two

The writer sees no excuse for the use of "poor" and "better" in Fig. 5. This application calls for the use of an extra elbow, and elbows are to be avoided whenever possible. "Best" in Fig. 5 leaves us the largest plenum space and this is an item to be desired. The writer has experienced cases in the use of "poor," Fig. 5, where temperatures would vary 20 degrees at the collars. The pressures in the various runs were guilty of "thermodynamical gymnastics." Basic formula as applied to the flow of air is the same as that applied to water. Lack of any definite and concise data relative to the design of casing tops, hoods, and plenum chambers for mechanical systems, should warn us to steer shy of "freaks" and stand by the reasonable and conservative.



These three types are frequently seen in forced air installations. The one chosen as "better" could be used if the rest of the system is so designed that there is definite "static" resistance at the entrance. The one marked "best" is probably the most common

"Extended plenums" are sometimes used, but in residence work they are expensive and require much room. Here the plenum or duct is carried through the full size and the branches tapped in. As the surface of the duct involved is large, such plenums overheat the areas through which they pass and should be insulated. Volume dampers must be installed in all branches unless very accurately sized. Fig. 8.

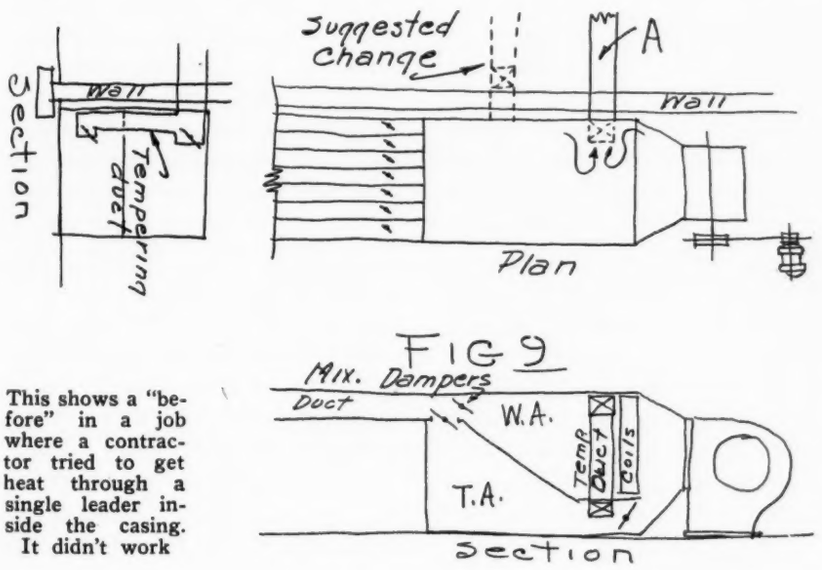


This shows what is known as an "extended plenum" which term has become popular, but lacks verification for residence work because such large air chambers heat up the basement and slow down the velocities. Such chambers also require careful sizing and balancing

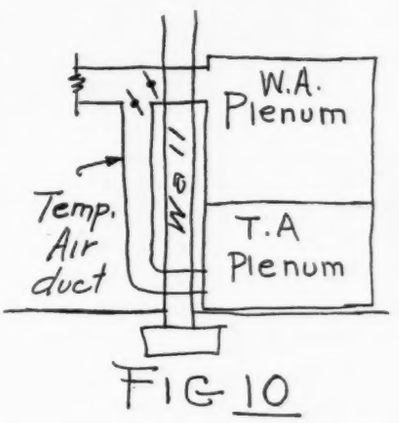
That crimes are perpetrated for which one may not be prosecuted is borne out by the included sketches in Fig. 9. While in this particular case the heating elements are steam coils, the problem in general is of interest to those doing forced air heating and to ventilation contractors.

Here as shown the designer placed one duct *inside* the plenum chamber on account of the brick wall. The writer was retained to test the system. The pressure readings were .5 approximately and the system was designed for this loss. No delivery of air was obtained in duct A.

The fan was speeded up, all volume dampers were closed most of the way, and a pressure of 1¼" was registered before duct A would produce its quota of air. The motor was changed from 5 H.P. to 7½ H.P. and still shows an over load. The writer recommended the change shown in Fig. 10. The owner and contractor are at present arguing about who is going to stand the expense of the change. If the ventilation contractor had even a superficial knowledge of the basic laws of the flow of air he could have pointed out this obvious error and been clear of responsibility.



This shows a "before" in a job where a contractor tried to get heat through a single leader inside the casing. It didn't work



Above is a recommended "after" alteration for Fig. 9 which should work providing the owner and the contractor will install it as it should go in

ONE SELLS ANOTHER

In 1929, the Schwartz Furnace Company sold an air conditioning system in the house to the left. Two years later, the owner of the house above watched this first system operate and ordered a duplicate. The thing which impressed this owner most was the cleansing action of filtered, forced air.

HOW one good installation will sell others and how certain features, not primarily of first importance, swing the scales in favor of certain qualities possessed by automatically controlled forced air is strikingly illustrated by an installation made this past winter by the Schwartz Furnace Company in Pittsburgh.

In 1929 the Schwartz company installed an automatically controlled, forced air system in the large home of Mr. Wm. G. Mayer which has as one of its architectural features a studio placed on the second floor above the garage. This studio, because of its size and exposure, is heated by four baseboard registers with one return from the end of the room. Since the house was completed this room has been much used by members of the family for social gatherings.

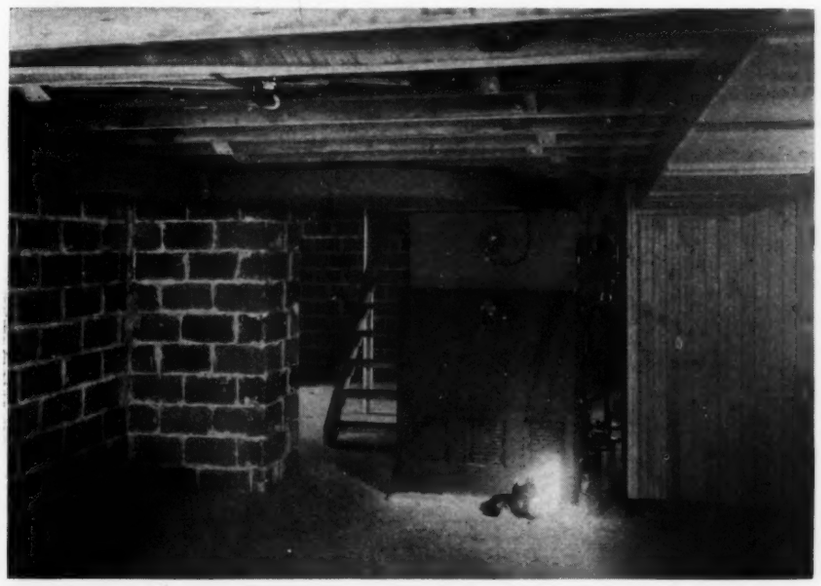
One day last summer the owner was entertaining several guests among whom was a neighbor, Mr. J. W. Crandall, who was right in the midst of planning his new home. The atmosphere became heavy with tobacco smoke, which condition was remarked on by one of the party. Mr. Mayer stepped to the fan switch and turned on the blower. The result is expressed in the words of Mr. Crandall when he wrote to the Schwartz company as follows:

"I was very much surprised and interested to note that within a matter of two minutes or less, the atmosphere was cleared of all smoke. Everyone also noticed how refreshing the air seemed to become; and it wasn't many minutes later before we all noticed a very definite drop in temperature. It was then that I became sold on air conditioning and requested Mr. Mayer to show me his plant in detail. After that, you received an order for a duplicate heating system to that installed by you in the home of Mr. Mayer two years ago."

This observation and experience with modern warm air heating, it should be remembered, comes from

a man who appreciates features which mean convenience and comfort.

The feature which first attracted Mr. Crandall's attention was the rapid cleansing of the air and the evaporation effect which became noticeable as soon as the blower began to circulate the air in the room. His interest, as he stated in the letter, was so aroused that he wanted to know all about the heating plant which could and did effect so remarkable a betterment in a condition which he had long thought of as obligatory.



This view of the heater shows the ceiling high plenum and the very flat ducts constructed to conserve head room. These ducts also show an interesting fabrication—short standing seam, strengthened bottom sheets and much longer side sheets. Interesting, also, is the takeoff at the bonnet

The system which was installed in Mr. Crandall's new home is a typical Schwartz installation with all the features which have been developed within the last few years. Heat is supplied by a Bryant unit heater with the furnace, blower, humidifier, and filters housed in one cabinet and operated by an electrical clock and controls which do not require any attention. Gas is the fuel used.

House Construction

Mr. Crandall's house is a brick and stone structure of seven rooms, garage built into the first floor, and two baths. In the system all return air is taken from the first floor, including the kitchen; infiltration coupled with air movement down the stairs being counted on to exhaust any surplus air pressure on the second floor.

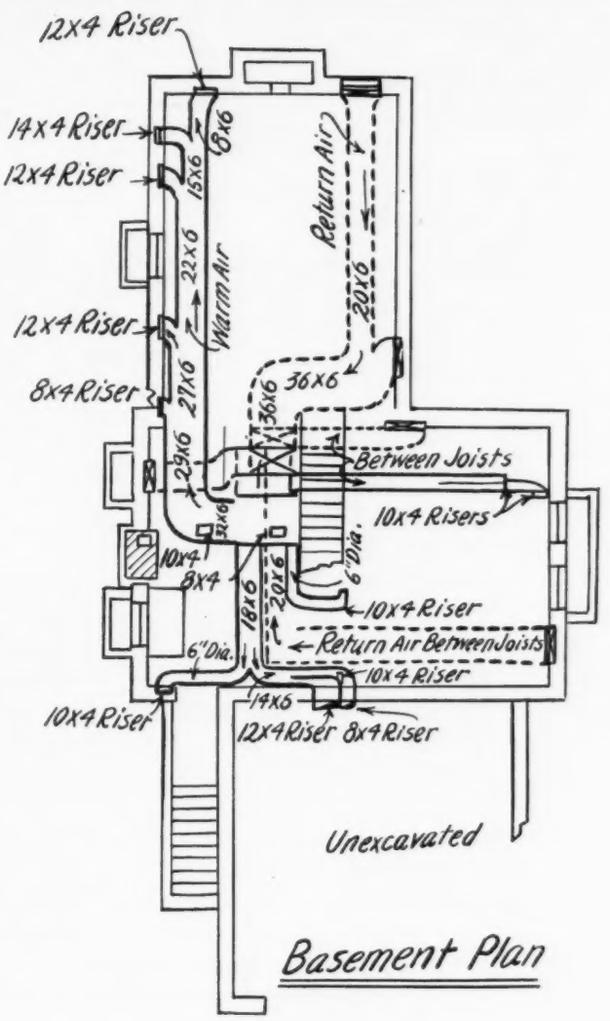
The piping plan shows that considerable attention was paid to locating supply and return runs to give as much free basement head room as possible.

Since only the area under the living room and dining room-kitchen is excavated, there is a comparatively small basement; however, the forced air system permitted placing the heater in one corner where it takes up very little floor area.

There are a number of features in the supply system showing good design and careful consideration of the problems involved. With the exception of two supply leads which connect with registers in the first floor vestibule and bedroom number 1, all inlets are arranged along one side of the house. A comparison of the piping plan with the two floor plans will show how this was worked out. The result is the elimination of at least two supply mains in the basement.

The bedroom over the garage is heated by a cross-over branch which comes up the garage-dining room wall to the garage ceiling. Bath number 2, which adjoins, is heated through a similar branch which is

The piping plan shows how basement space was conserved by placing the heater against one wall and running the ducts along outside walls. For a house of this size, this piping system is unusually compact. Low velocities are used

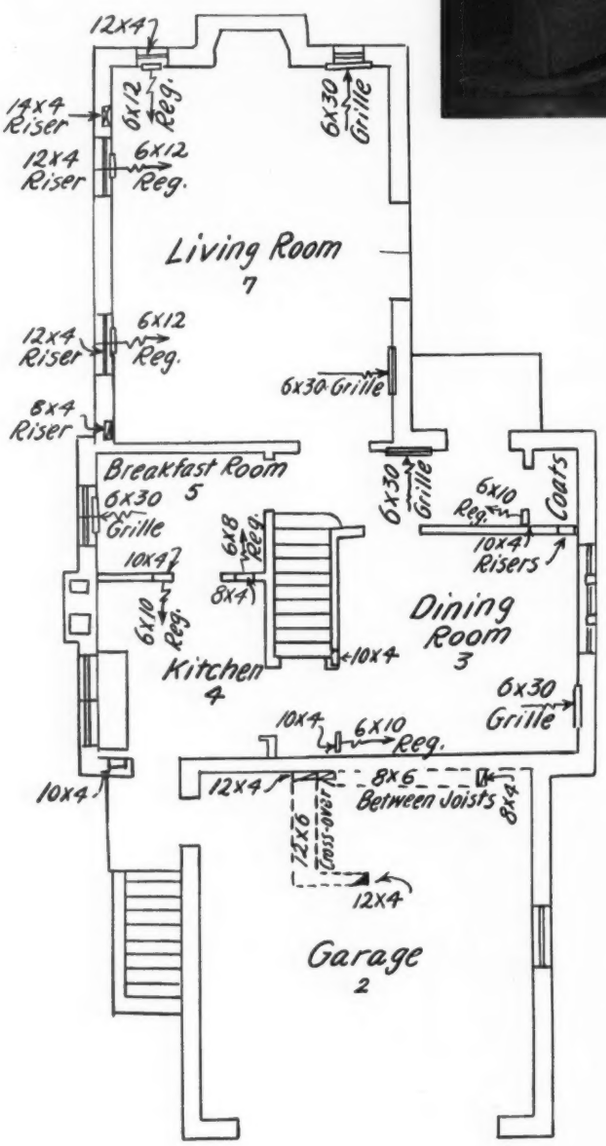


carried as a cross-over between the garage ceiling joists.

One of the interesting points of the system is the use of more than one register in the living room and master bedroom. In the living room, heat is introduced through three registers, one located in the end wall and two along one wall. Return from this room is through two grilles in the opposite wall. In the dining room there is one inlet and one return with another return just outside the dining room doorway in the small entrance hall.

Mr. Schwartz calls attention to the registers and grilles used in this installation. All faces throughout the house are of the new baseboard type, 6 inches high and as long as necessary to get the proper face area. All faces fit flush with the face of the baseboard and have a new forced air grille. These faces were furnished by Hart & Cooley Manufacturing Company. The interior photograph shows how inconspicuous these faces are.

Above is a view of the living room showing one of the low and long, flush baseboard faces used throughout the house. Homes of this type require the most inconspicuous faces possible to harmonize with wall colorings and textures



First Floor Plan

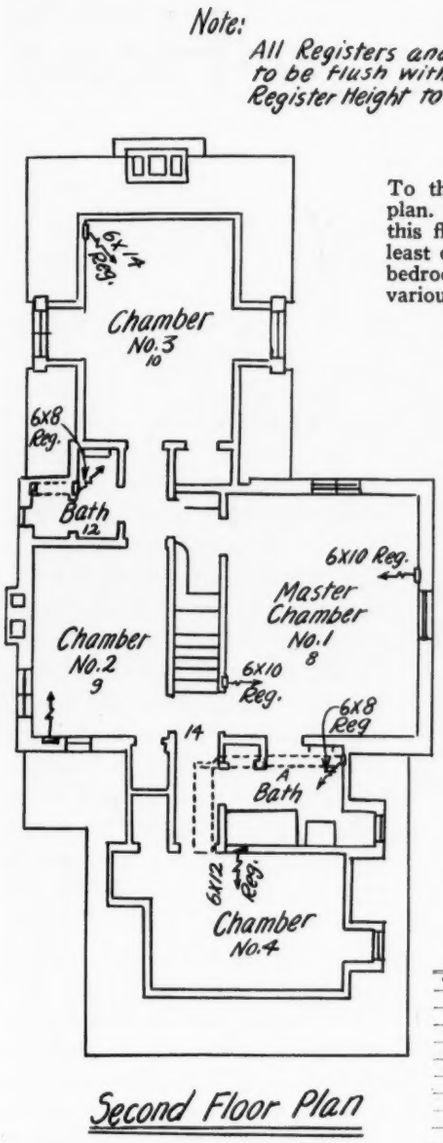
The first floor plan shows inlets along one wall of the living room and outlets on the opposite w a l l. Most of the other rooms have one inlet and one return excepting the kitchen. A feature of the plan is the fact that practically every wall and partition is used to carry either a warm air riser or a return. Even the garage ceiling is so used

Design Calculations

Like all Schwartz Furnace Company's installations this interesting system was carefully designed by the B. t. u. method. The calculations used are shown in the copy of the data sheet. This sheet shows that a temperature rise of 70 degrees was used with coefficients of heat transmission of 1.1 for the glass, .25 for the walls, .2 for the ceilings and floor and .01 and .02 for the infiltration.

Total heat loss for the house was set at 86,940 to which was added 10 per cent as a safety factor. The heater used has an output capacity of 105,600 or more than ample to take care of pressure drop or unusually severe weather.

Air to the furnace is filtered through two sections of Reed filter and heat is supplied by a 1300 C.



Second Floor Plan

To the left is the second floor plan. No return is taken from this floor, but each room has at least one register and the master bedroom has two. Note the various locations of these registers

Below is the data sheet. Every item is accounted for, including lessened heat loss in the basement recreation room

FIGURED BY RB CH'K'D. BY MM DESIGNED FOR J. M. CRANDALL, MURTLAND AVE. AT PENN. AVE. CONTRACTORS THEO. EICHHOLZ, ARCHITECT
SHEET NO 1 DATE JUNE 3, 1931

NO	ROOM	DIMENSIONS	CUB. CONT.	C.F.M.	RDTS. (400)	RDTS. (350)	REG.	GLASS (1.1)	WALLS (.25)	CEILING FLOOR (.2)	HEAT LOSS (.02)	TEMP. DIFF.	B.T.U. LOSS	B.T.U. PER VENT	DUCT AREA	REG. TEMP.	FAN RPM.
1	GAME RM.	15x19'6"x7	2047		33		2-10x12	—	—	292	2047	70°	6930				
2	DINING	12'x13'x8	1213		22		6x12	20	89	—	1213		4760				
3	KITCHEN	9'x7'x8	685		23		6x10	32	80	—	685		4830				
4	BKFST.	6'x9'x8	464		10		6x8	12	38	—	464		2170				
5	ENTRANCE	PER PLAN	696		18		6x12	23	81	—	696		4130				
6	LIVING	15'x20'8"	2615		108		3-6x12	68	407	—	2015		23030				
7	MASTER C.	16'x13'x7	1971		48	58	2-6x10	24	193	210	1971		10150				
8	CHAMBER	2 12'x9'x7	813		28	22	6x10	18	115	116	813		6160				
9	" #3	PER PLAN	1067		49	39	6x12	24	291	168	1067		10640				
10	" #4	" "	899		40	32	6x12	13	260	128	899		8810				
11	BATH #1	" "	392		14	11	6x8	9	54	56	392		2940				
12	" #2	" "	178		7	5	6x8	4	34	25	178		1510				
13	HALL	3x15x7	315		5	4	—	—	—	95	315		1050				
14			12855		405	151							86940 = B.T.U. LOSS				
15													8694 = 10% SAFETY FACTOR				
16													95634 = B.T.U. DELIVERED				
17		C.F.M. = 95634 x 55 = 1252 C.F.M.															
18				70x60									1-#3-LF-73 BRYANT UNIT = 105,600 B.T.U. CAP.				
19																	
20													1300 C.F.M. = CAP. OF BLOWER				
21																	
22													2- REED AIR FILTERS				

F. M. blower, for a required C. F. M. of 1252 for the house.

The data sheet shows a game room in the basement. This room is the only one in the house for which the coefficient of .01 was used for infiltration. This room is quite large and is heated by two registers to a temperature of 70 degrees.

A comparison of the data sheet with the piping plan will show that this system is distinctly a low velocity installation. There is approximately 2.7 square feet of warm air main to carry a C. F. M. of 1252. This results in about 460 F. P. M. in the mains and just over 300 F. P. M. in the risers.

The basement photograph shows that these mains are all 6 inches deep, and are fabricated with a standing seam bottom sheet in short lengths with side sheets approximately three bottom sections long and Pittsburgh side locks. All the mains are taken off just under the joists, the bonnet being built up into a high plenum chamber with the large mains taken off the top.

Like the system installed in the Mayer home, the blower is provided with a high speed pulley and a mechanical control for circulating air in the summer season. The filters will cleanse this air similarly to the other installation and give the degree of cleaned air noticeably circulated, which first attracted Mr. Crandall's attention. No cooling provision, other than this circulation, will be available unless cooling sections are added later.

System Controls

Operation of the system during the heating season is, of course, entirely automatic. A house thermostat turns the burner on and off while the blower is actuated by a bonnet switch. Register temperatures are set at 135 degrees which means that the blower goes on at about 150 degrees allowing approximately 9 degrees loss for every 10 feet of basement duct.

This interesting installation is only one of many designed by the Schwartz company working with the manufacturers of the equipment used. However, the sale of these modern systems is strictly a Schwartz accomplishment. Several previous articles have been published in AMERICAN ARTISAN describing Schwartz jobs. In the past two years, since the first article was published, very definite changes in design have been developed and adopted by the company, as their installations testify. Such progress, coupled with intelligent selling, has made it possible for the company to sell systems averaging well over $1,500 and running as high as $7,700.

Pattern For a Dust Collector Hood

For E. W. Robinson, Bridgeton, N. J.

By **W. R. HAINES**

Contributing Editor

A SKETCH of the following layout was submitted by Mr. E. W. Robinson, of Bridgeton, N. J., with the request that it be developed. This problem may be of interest to others in sheet metal work.

The twisted collector hood pipe was designed with approximately equal flow area throughout its length. The area across the section f″a″b″ (plan view) being equal to the 20″ x 24″ rectangular pipe opening. The general appearance of the unit was also given consideration in the design and in addition the design was made to meet Mr. Robinson's dimension specifications.

The elevation view and the end view of collector hood were first drawn. The contour of the curved pipe in the plan view was then determined by projection of corresponding points lying on these curves in the elevation and end views. The bottom side of the pipe was given a slight twist as shown by the curved line m′c′b′i′ to improve the appearance of the pipe in the elevation view.

The pattern for the conical shaped hood or frustrum of a cone is laid out as shown by pattern N. 1. The radius of the outer arc B is equal to the slant height of the cone as shown by dimension B in the elevation view. The radius of the inner arc A is equal to the slant height A shown on the elevation view. The 222⅔° arc is found by the ratio of the base diameter of the cone in feet to twice its slant height in feet times 360° or is equal to (7/2 B) x 360. The width of the strip i-o is determined by triangulation from its respective plan and elevation views. The distance from point i to f along the curved line is equal to the distance along the curve from f″ to i″. Point g on the pattern is determined in the same manner as point f.

Pattern No. 2 which is the top of the frustrum of the cone and the top side of the twisted pipe can be laid out by taking its respective distances lying on the plan and elevation views of this section. The distance between the parallel lines e, d and f, a is equal to the distance along the arc from a′ to d′. The height of point e above the line f-g extended is equal to the height of e″ above the line of f″-g″ extended and the length of the line e-d is equal to the line e″-d″.

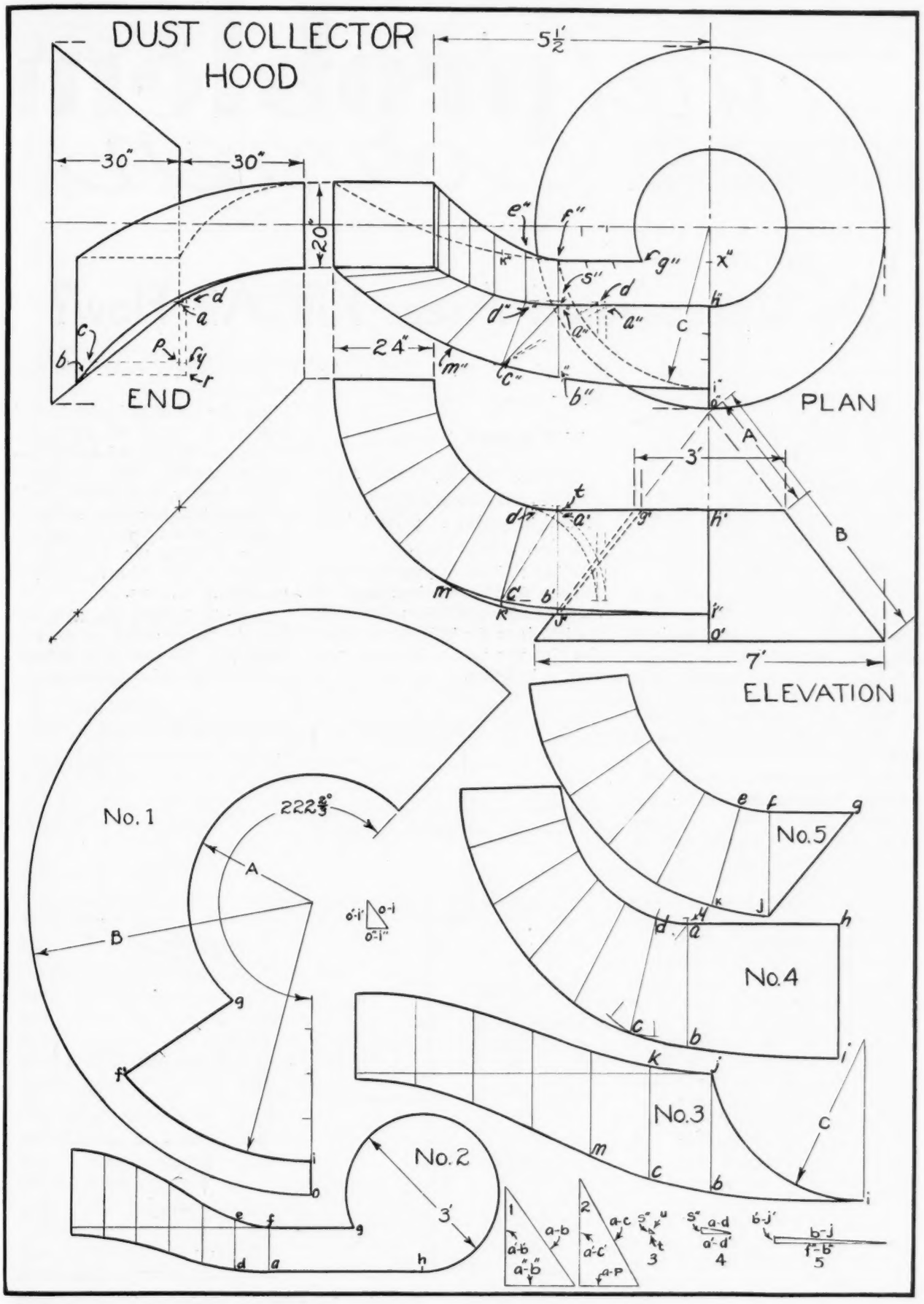
Pattern No. 3 is the bottom side of the twisted pipe. The perpendicular distance between the line j-b to point i is equal to the line f″-x″. The height of point j above point i is equal to the line i″-x″. The length of the line b-j is determined by triangulation as shown by triangle No. 5. The perpendicular distance between the lines k-c and j-b is equal to the distance along the arc from j′ to k′. The length of the line k-c is also determined by triangulation in the same manner as the line j-b. The remainder of the pattern is laid out by taking the respective lengths lying on the plan and elevation views following the same procedure as was used in laying out pattern No. 2.

Pattern No. 4 is a twisted section and requires more work in its development than of the previous patterns. The line h-i on the pattern is the hypotenuse of a right angle triangle whose altitude is equal to the line h′-i′ and whose base is equal to the line h″-i″. The line a-h is equal to the line a′-h′ or a″-h″. The line a-b is the hypotenuse of the triangle No. 1. Sheet metal workers are well acquainted with the method of triangulation in finding the true lengths of lines, but there are conditions under which another method, quite common in descriptive geometry called revolving a line parallel to a plane, may be used to advantage, as the method is simple and often leads to less work and confusion. In this problem, to find the true lengths of the diagonal line a-c and the sectional line c-d requires the use of the end view when triangulation is used, and leads to some confusion and possible error if one is not careful. Both methods are shown so that a choice can be made between the two for this particular type of problem. The true length of the line a-c by triangulation is shown by triangle No. 2. The length of the line a′-c′ in the elevation view is used as the altitude of this triangle. The length of the base line a-p is found by projection of the points a′-a″ and c′-c″ into the end view. This line a-p is the horizontal line between the points a and c in the end view. This line a-c can be found more quickly by revolving it parallel to the horizontal plane. Revolve point a′ around c′ to a position that is on a horizontal line with point c′ as shown. Then project this new location of, a, on to the line a″-h″ in the plan view. This intersection, a, is the new position of a″ after revolving the point a′ into its new position. The line connecting a with c″ is the true length of the line a-c.

Swing an arc whose length is a-c from point, a, on the pattern. Now find the height, u, of point, d, above point a as shown by triangle No. 3. Next find the length of the line a-d by triangulation as shown by triangle No. 4. Point, d, can now be located on the pattern after finding the height of, d, above, a, and the length of the line a-d.

Next find the true length of the section line c-d either by triangulation or by revolving the line parallel

(*Continued on page* 41)



This drawing shows the complete patterns for the collector hood

. . . the Problem Corner

Do Unexcavated Areas Kill Air Flow?

Followers of the "Problem Corner" were given a request in the March 28 issue in which a contractor had a heat pipe which doesn't work. He feels that the trouble lies in the fact that a part of the run passes through an unexcavated area.

Here is what he says—

"Three leaders from the furnace pass through a heavy rock wall which surrounds the basement. Beyond this wall the area under the house is unexcavated. The leaders pass through a hole in the wall through a thimble giving at least 1 inch of air space all around the pipes. This thimble is plastered into the wall.

"Two of the pipes do fairly well, while the third pipe, which supplies the bathroom, fails to deliver. All three pipes are covered with two layers of 12-pound asbestos paper and also a wrapping of corrugated asbestos paper.

"Just what exactly is the insulating value of the wrappings described and should the bare pipe have less loss than the pipes which are covered?

"The leader to the bathroom passes through one partition wall, then through the rock wall described. Just beyond the wall the leader turns up through the floor of the room above, through this room to the ceiling, through the ceiling and into a floor register in the bathroom above.

The leader through the first floor room is bare and hugs the wall. The pipe turns out at the ceiling to the register boot.

"What I want to know is—does an unexcavated area slow up the flow of warm air in pipes going through such an area, and if so, what protection can be given the pipes so that the runs will work?"

An interesting reply to this problem is given by W. S. Shuster, who says—

W. S. Shuster, Pitman, N. J.

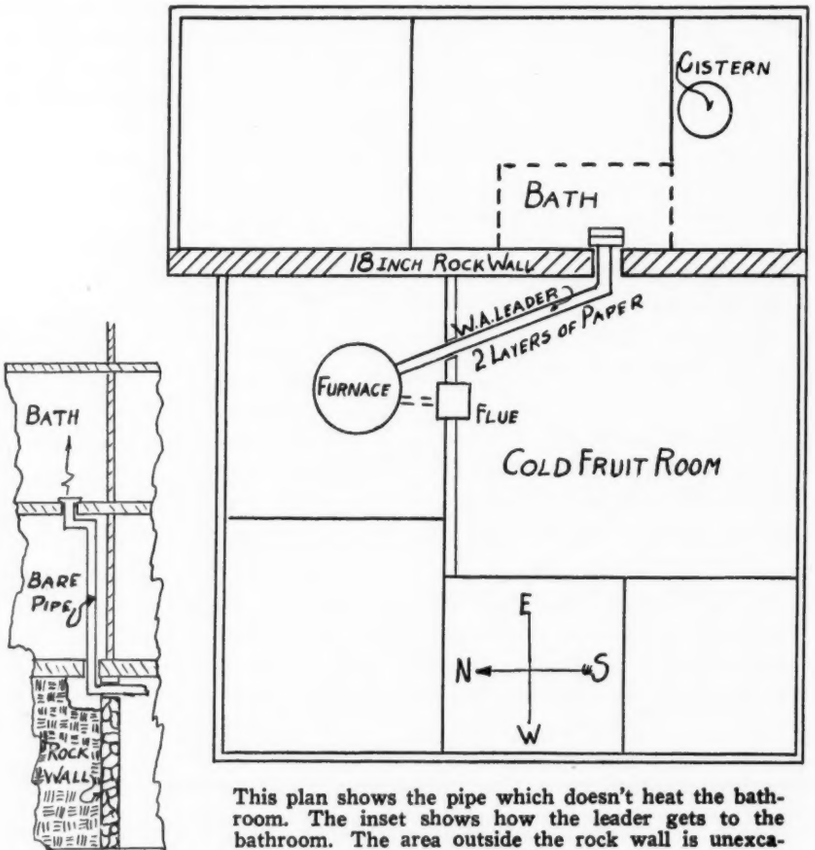
From Pitman, N. J., comes a letter also recommending construction of a tight pocket to prevent heat loss. Mr. Shuster says:

On the problem on page 23, March 28 issue, the plan submitted does not show the other two leads, or how long the lead is to the bathroom or what size pipe was used in basement and stack to bathroom.

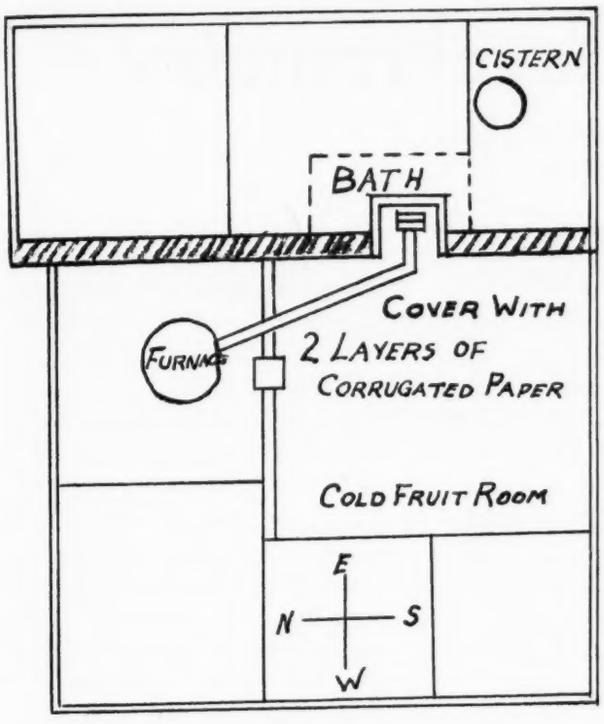
Here is how I would do it, if the job was mine.

The pipe should be insulated in cold fruit room. Warm air pipes going through an unexcavated area will not function properly. Make an enclosure as per drawing, by building a pocket of cement blocks or brick and cement bottom to present dampness. Make the pocket air-tight, two feet wide by whatever depth it takes to get beyond the riser to bathroom.

You will find the two other leads will give better results by doing the same thing. The stack to the bathroom should be enclosed and insulated.



This plan shows the pipe which doesn't heat the bathroom. The inset shows how the leader gets to the bathroom. The area outside the rock wall is unexcavated at shown



This is the layout suggested by Mr. Shuster. He advocates building an air-tight wall around the elbow and making sure that this pocket is the same temperature as the basement. The floor of the pocket should be sealed

The Church Problem

THE sketch shows the heating system designed to heat a small country church. The reader who laid out the system says he thinks it will work all right, but he would like to know how other readers would plan the system.

Here are the principal factors affecting the design. The building is a frame structure—narrow siding, on paper, on 2 by 4 studs, building paper, wood lath and plaster.

There are twelve windows in the building—five down each side and two windows on either side of the front entrance. These windows are all of the same size—32 inches wide and 6 feet high.

The auditorium is 12 feet high with a flat plaster ceiling on wood lath on roof stringers. Above the lath the joists are open. So is the space under the peak of the roof.

Partitions A and B are 8 feet high and open to the ceiling.

The two cloak rooms are really large closets, full ceiling height partitions with doors and a 10 by 12-inch register to let heat in.

C. F. Malone, Utica, N. Y.

C. F. Malone from Davenport, Iowa, analyzed this installation and disagrees with the plan submitted by the contractor. He says:

"I don't think I would heat the church as shown, for while one might heat it that way, there is certainly no economy in doing so either from an installation standpoint, or a heating standpoint.

"In the first place, I would never install less than a furnace rated by some responsible manufacturer with a rating of about 900 inches, and I would want to be sure that it was a rating made by and certified to by the National Warm Air Heating Assn.

"I note the contractor calls for a 26-in. fire pot furnace; this, as we said before, in our judgment, is away too small to heat this building.

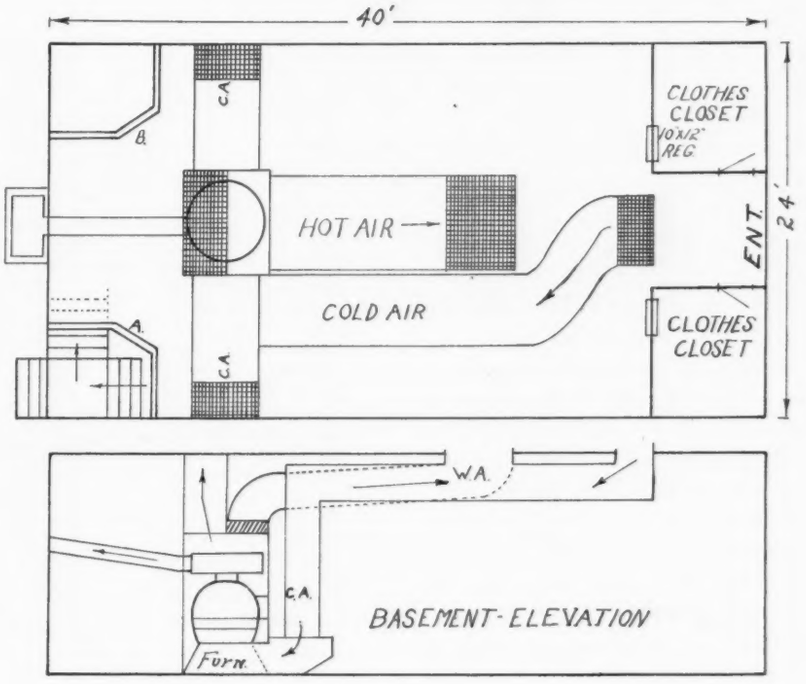
"If I was asked to heat this building, providing the floors were level, I would simply take one pipe from the top of the furnace and return to the bottom of the furnace with one cold air pipe. This will make the most efficient installation one could devise, and the beautiful thing about it is, it costs less to install."

B. F. John, Philadelphia

Still another suggestion comes from B. F. John, in Philadelphia, who writes—

"By all means this church should NOT be heated as shown in the plan which you show with your problem. If the contractor persists in installing the system as shown, he will be sorry for it because the system won't work.

"In order to give a thorough analysis, a person ought to know in what part of the country this church is located. If it is in a cold section, then the system is inadequate. If the church is in the south, the system may get by. In any event a simpler, but better system can be installed for less money."



Fundamental Psychrometry

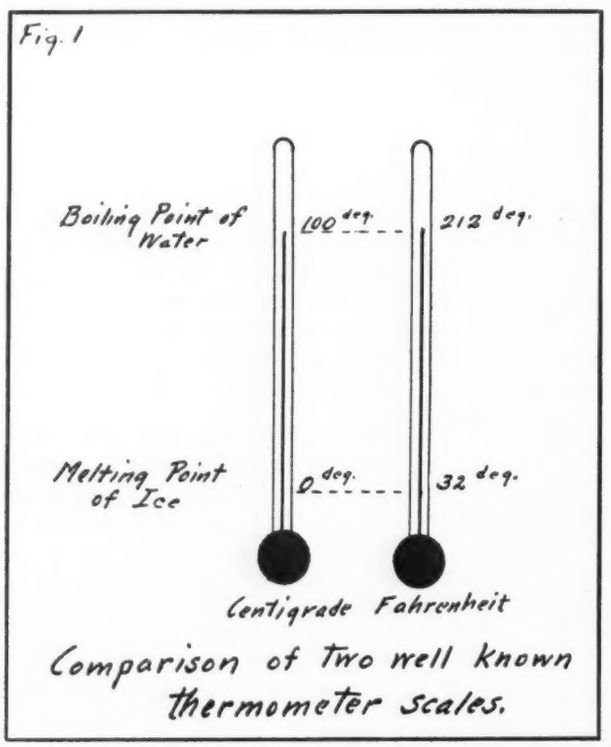
By MALCOLM TOMLINSON
Consulting Engineer

WE human beings, through our senses of touch and feeling, distinguish between things which are hot and cold but we are unable, always, to detect close differences. In fact, these senses of ours often prove deceptive. Suppose we take three bowls filled with water. Let the temperature of the water in the first bowl be 70 degrees Fahrenheit, in the second bowl 60 degrees and in the third 50 degrees. Place the right hand in the water of the first bowl and the left in that contained in the third bowl. After a few minutes remove both hands and plunge them immediately in the water of the second bowl. The right hand will feel warm and the left will have a sensation of coldness.

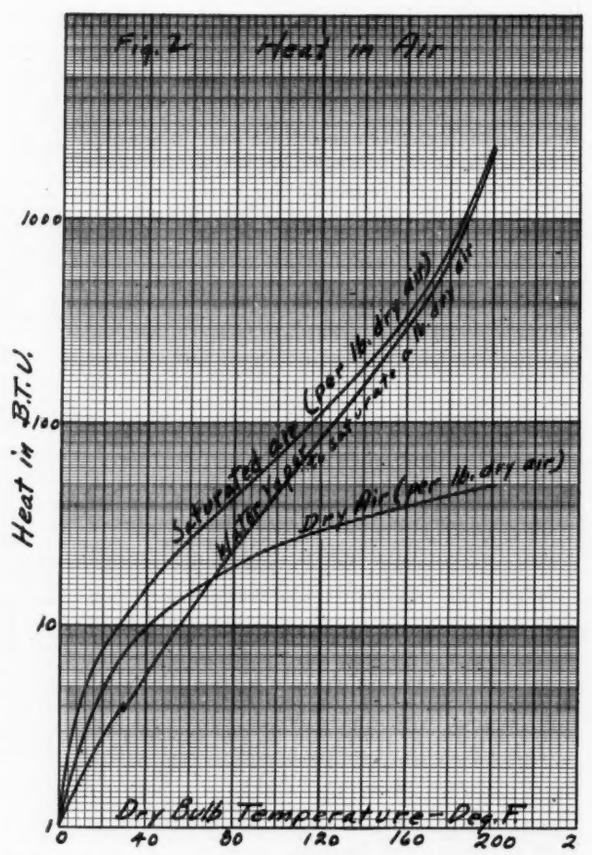
In order that we may detect close differences in heat and also that we may be able to duplicate our observations a fixed and standard method of measurement must be available. Temperature, measured in degrees, is the method in general use. Through its aid reliable information as to hotness or coldness may be secured.

Temperature is measured by an instrument called a thermometer. This instrument consists of a hollow bulb and stem, is made of glass and is filled with a liquid or gas. Most thermometers are filled with either alcohol or mercury. The bulb of the thermometer is sensitive to heat and cold. The stem is etched in uniform divisions so that the expansion of the fluid or gas with heat or its contraction due to cold may be indicated.

A degree of temperature can be determined by any scale, or set of divisions, engraved on the stem. Two scales are in general use. One is called Fahrenheit and the other Centigrade. **(See Fig. 1.)** The first scale indicates freezing (or the melting point of ice) at 32 degrees and the boiling temperature of water at 212 degrees. The second indicates freezing at zero and boiling at 100 degrees. As 180 degrees Fahrenheit is equal to 100 degrees Centigrade a single degree Fahrenheit is equal to five-ninths of a degree Centigrade. As the Fahrenheit thermometer is in most general



Most of us know that there are two kinds of thermometers — Fahrenheit and Centigrade. The drawing to the left shows their relationship



Above 70 degrees Fahrenheit the heat in water vapor increases much more rapidly than the heat in dry air. Therefore, at high temperatures, the total heat in saturated air is not much more than the heat in the water vapor. Note the change in heat for water vapor at the melting temperature of ice

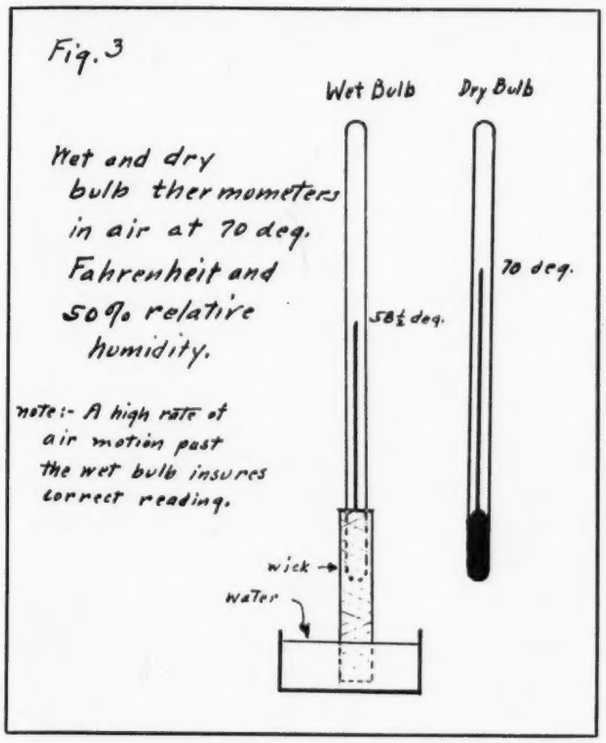


Fig. 3
Wet Bulb
Dry Bulb
Wet and dry bulb thermometers in air at 70 deg. Fahrenheit and 50% relative humidity.
58½ deg.
70 deg.
note:- A high rate of air motion past the wet bulb insures correct reading.
wick
water

Most of us also know that there is a difference in wet and dry bulb thermometers and also are familiar with the construction of these two types of temperature registering instruments. This drawing shows basic construction and the comparison of temperatures registered at one set of inside conditions. The difference shown—from 12 to 15 degrees is average all up and down the dry bulb scale

use it is this instrument with which we are most concerned.

When the bulb of a thermometer is bare it is said to indicate the dry bulb temperature known, for brevity, as the dry bulb. This dry bulb temperature is not what it seems to be for, when used to indicate the heat in air, it actually only gives the heat in the dry air. As the heat in the water vapor is not included in the dry bulb temperature a thermometer does not indicate the total heat in air.

This, we will see, is a very important fact in air conditioning and has a vital bearing on human comfort measurements. If the temperature of the dry bulb remains constant, an increase in the relative humidity can only be due to an increase in the amount of water vapor in the air. Since water vapor, like water, holds a definite amount of heat which changes with the temperature any increase in the quantity of water vapor brings a corresponding increase in the total heat of the air. It is this heat, at high humidities, which gives people discomfort at temperatures which are very comfortable when the relative humidity is normal. The dry bulb temperature is not, therefore, a measure of comfort since one can be comfortable or uncomfortable at the same temperature. **(See Fig. 2.)**

Dry bulb readings, taken near warm objects such as radiators, are somewhat higher than the temperatures of the dry air. This is due to radiant heat received from the warm object. Radiant heat travels, like light waves, in straight lines through the air without in any way influencing the temperature of the dry air. Care in the location of thermometers is therefore necessary when air temperatures are taken in rooms having heat radiating objects.

A thermometer which has a bulb covered with a clean white cloth wick, tubular in shape, which fits snug and is in contact with a vessel containing water indicates what is known as the wet bulb temperature. *Unless the air is saturated* the wet bulb temperature will be lower than the dry bulb. Furthermore, the temperature difference between dry bulb and wet bulb will be greatest when the air motion past the wick is high and when the air is bone dry. **(See Fig. 3.)**

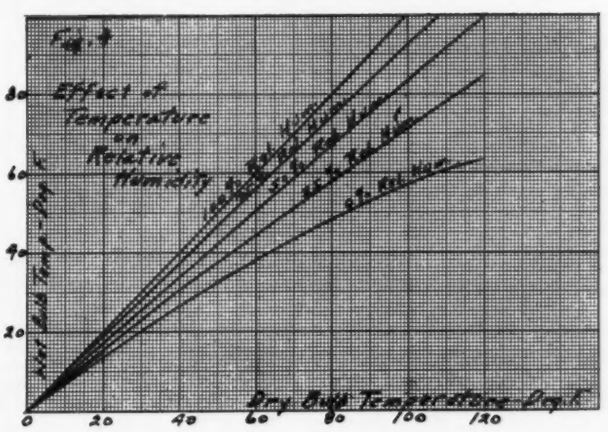
The first of these relations shows that true wet bulb temperatures can only be had by either revolving the wet bulb thermometer very fast or by drawing air past the thermometer at high speed. The second relation provides a means by which the relative humidity can be measured, or determined, through the temperature difference called the wet bulb depression.

Wet bulb temperature is the result of the evaporation of water from the wet surface of the thermometer bulb. The rate at which this evaporation proceeds depends on the relative humidity of the air and is thus proportional not only to the wet bulb depression, but also to the relative humidity. The faster the evaporation the greater the cooling effect on the thermometer, the larger the wet bulb depression and the lower the relative humidity.

The wet bulb is thus the temperature of evaporation.

Fig. 4

At saturation, or 100 per cent relative humidity, the wet and dry bulb temperatures are the same. For any dry bulb temperature above zero decrease in the wet bulb means a decrease in the relative humidity



It is also the saturation temperature for which the total heat in air is exactly equal to the total heat units in the air mixture which it measures. **(See Fig. 4.)**

For example, the wet bulb temperature for a 90 degree dry bulb and 50 per cent relative humidity is desired. The heat in dry air at 90 degrees is 21.74 heat units per

pound of dry air. The heat in water vapor at saturation for 90 degrees is 32.40 heat units so that for 50 per cent relative humidity the heat units would be 16.20. Then the total heat of this air is 21.74 plus 16.20 or 37.94 heat units per pound of dry air. The saturation temperature for this number of heat units is 75.14 degrees which is the wet bulb temperature sought.

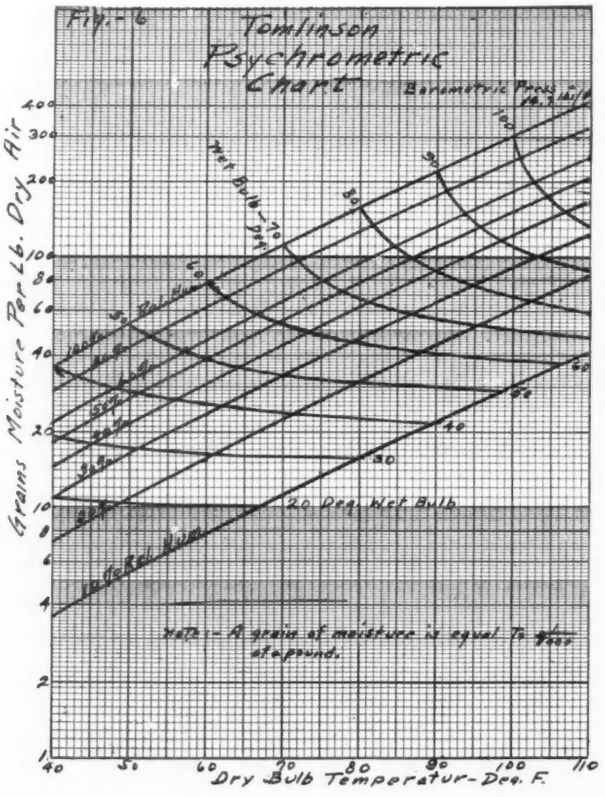
seven thousandth part of a pound it is an extremely small unit of weight. To obtain the relative humidity with this chart the intersection of the wet bulb and dry bulb temperatures is found. **(See Fig. 6.)** The relative humidity curve which would pass through this intersection is the correct reading. Frequently it has to be estimated. Directly to the left of the intersection, at the margin, is the absolute humidity.

Every air mixture has a temperature at which saturation will occur if the dry bulb be lowered to that point. When saturation occurs a very slight amount of water vapor separates from the air and appears on adjacent surfaces in the form of dew. If the surface happens to be metallic or glass the first appearance of this dew is not hard to see.

For 100 *per cent relative humidity the dry bulb temperature and the dew point are the same, but for any other relative humidity the dew point is lower than the dry bulb.*

On the psychrometric chart the dew point for any air mixture can be found on the 100 per cent relative humidity curve directly to the left of the intersection of the wet and dry bulb temperatures. **(See Fig. 6.)** For example, air within an 80 degree dry bulb and a 70 degree wet bulb will have a dew point of 56 degrees.

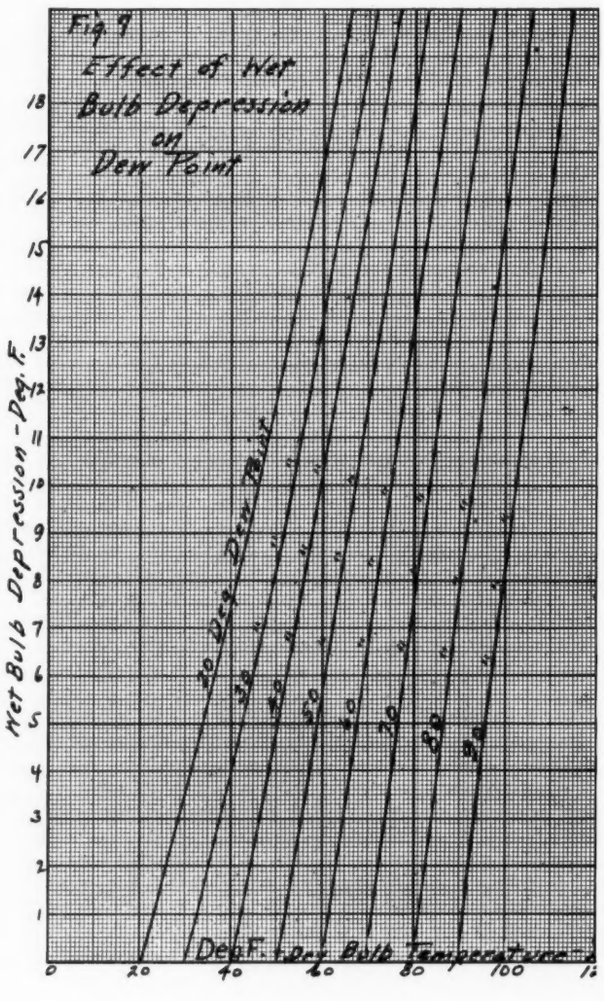
If the dry bulb of this air were



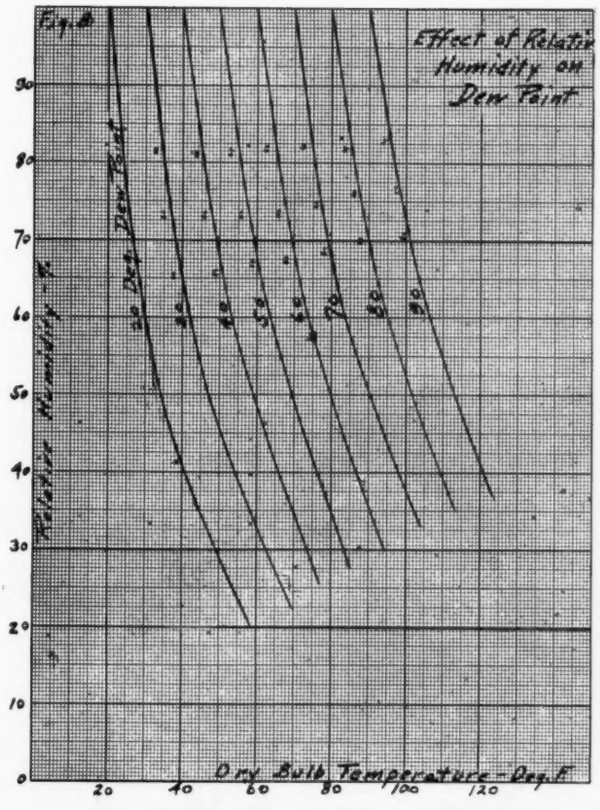
Two sets of curves—wet bulb and relative humidity—are shown here. Suppose, readings were obtained of 70 degrees wet bulb and 80 degrees dry bulb. The relative humidity at the intersection of the vertical 80 degrees dry bulb line with the 70 degree wet bulb is 43 per cent.

The wet bulb depression is usually measured with a wet and a dry bulb thermometer mounted on a board or panel in such a manner that the two thermometers can be slung, or revolved, by hand. This instrument is known as a psychrometer. Correct readings are obtained when the wet bulb thermometer is read quickly after a high speed slinging operation.

The psychrometric readings can best be interpreted by a psychrometric chart. In its simplest form this chart consists of wet bulb and relative humidity curves plotted against dry bulb temperatures and the absolute humidity. The latter is usually given in grains of moisture per pound of dry air. As a grain is a



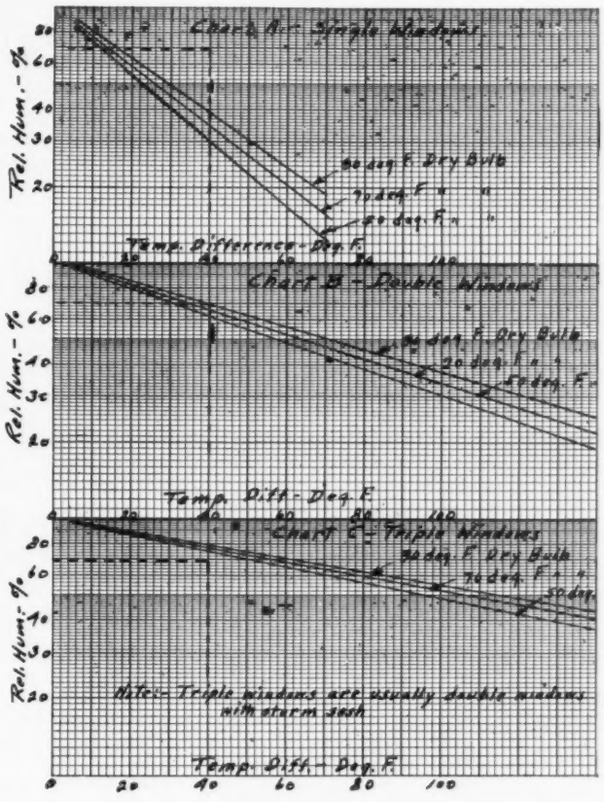
These dew point curves starting with air in a condition of saturation at the bottom of the chart show dry bulb, wet bulb and dew point are the same value in degrees. Increase in the wet bulb depression or in the dry bulb temperature affects low dew points more than those which are high



▲ Where the relative humidity is lowered without changing the dry bulb the dew point falls. Where the dry bulb is raised without any other changes the dew point remains constant, but the per cent relative humidity falls. In the first case condensation is prevented by moisture removal while in the second the moisture in the air remains the same but the temperature difference increases.

to be lowered without any change in the amount of water vapor present, dew would begin to appear at 56 degrees. At this latter temperature the relative humidity would have reached 100 per cent. If the temperature of the dry bulb for this mixture be decreased below 56 degrees more water vapor would separate out of the air and the dew would change to beads of moisture which would run down in streams over the exposed surfaces.

Should inside air, at the wet and dry bulbs just mentioned, come in contact with surfaces that have a temperature as low or lower than 56 degrees droplets of moisture will form on these surfaces. This is what happens when the outside temperature is so low that the cold penetrates through the building. Quite naturally the same result is had on the outside surfaces of buildings when a temperature below the dew point of the outside air is reached within doors and the building insulation is insufficient to prevent the outward flow of cold. Such action is known as condensation and, as it can cause serious damage to property, its appearance within doors must be prevented. In nature condensation is known as fog, mist, rain, sleet, snow or hail.

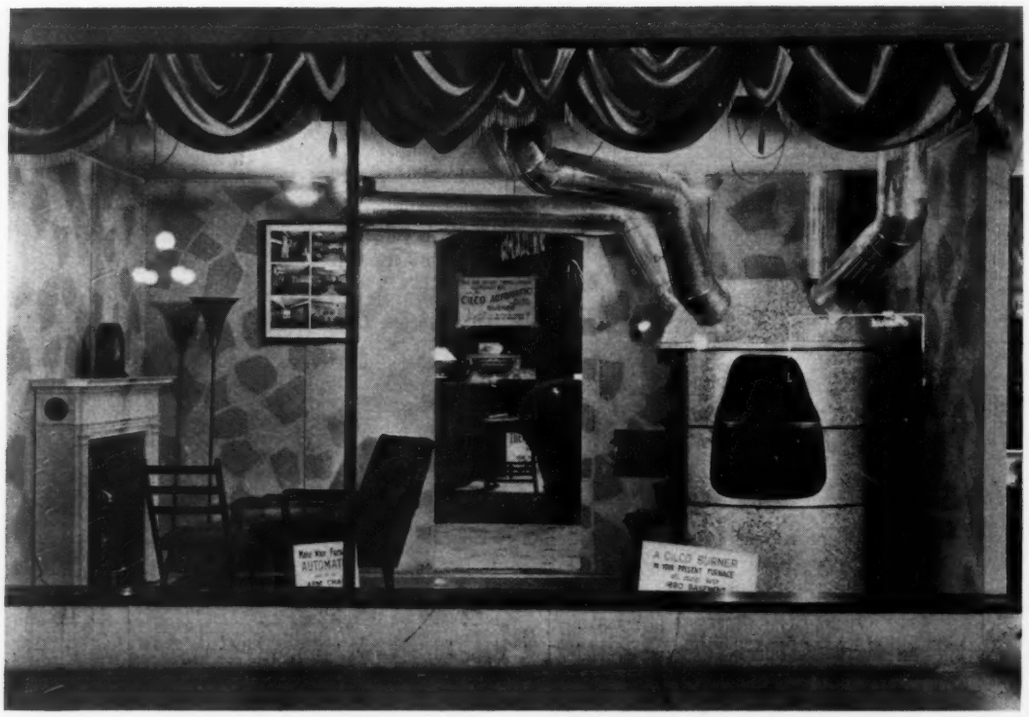


▲ The charts to the right are used to determine the number of glass sash required to prevent condensation. Take an inside temp. of 50 deg., an outside temp. of 10, a rel. hum. of 70 per cent and a single pane window. Condensation will occur on this window and also on a double window. But storm sashed double windows (Chart C) will prevent condensation

Condensation can be remedied in three different ways. Heat may be used to raise the dry bulb, moisture can be removed from the air and the relative humidity thus lowered or insulation can be supplied to reduce the flow of cold through the particular portion of the building where the trouble occurs.

The first two remedies have the advantage of adjustment in control while the third furnishes permanent relief against a definite outside weather condition. Due to great variations in outside weather for various localities and to the many combinations of temperature and relative humidity which can be had with the aid of air conditioning it is necessary that each situation be studied to determine if condensation can occur and the best method to use for its prevention.

Of all parts of buildings the windows afford the least protection against the flow of heat and cold. This is because glass is a very poor insulator for heat. A remedy for window condensation is in the use of double windows or of double windows provided with storm sash. The latter case can be considered as equivalent to triple windows. Condensation charts for single, double and triple windows enable one to determine the number of sash necessary to prevent condensation. **(See Fig. 9.)** In this connection it must not be forgotten that tightness of the sash and of storm windows is of the utmost importance to secure best results. Metal weatherstripping, for example, insures uniformity of tightness.



A Co-operative Display Effort To Sell Gas House Heating

THERE was recently staged in Peoria, Illinois, an unusual and highly interesting gas house heating display conducted under the joint co-operation of the local gas company and several manufacturers and dealers in gas house heating furnaces. As shown in the photographs, the display was most attractively staged and served to focus public attention on the progress made in gas house heating.

The following manufacturers displayed one or more of their products:

Bryant Heater and Mfg. Co., Bryant Gas Warm Air Heater; American Foundry and Furnace Co., Juneair and gravity equipment, also Lincoln furnace with a Cilco conversion burner; Meyer Furnace Co., Super B gas furnace; Copeland Refrigerator Co., air cooling equipment; Roberts-Gorden Co., conversion burner; Rudy Furnace Co., Bonair gas air conditioning system.

Reports from Peoria state that during the first forty-five days of the sixty-day exhibit, more than 5,000 persons visited the display and inspected the various heating units shown.

Automobile manufacturers and others have known for many years that people will visit public displays much quicker than they will walk into a show room. The reason lies probably, in most persons' dislike of having to listen to sales talk. With air conditioning coming into popularity, similar sales tactics will have to be employed. The display told about in this article is just such an attempt to get the public into one group exhibit where salesmen can explain their products. Mass visiting brings people where individual shopping falls down.

Of more interest is the fact that these reports state that about 30 good prospects a week were secured by the salesmen who were in attendance. An interesting sidelight on the visitors is the report that during these forty-five days most of the visitors came in small groups which made their handling by the salesmen an easy and personal proposition.

The salesmen report a surprisingly high number of actual sales and also a gratifying attendance from persons who had never been contacted on buying new heating equipment. Records also show that a large percentage of home owners who had already been interviewed took advantage of the display to look over all the various units.

This display was held in a down-

town location in a large room which had previously served as an automobile show room. The space selected was well lighted indirectly and through large show windows. The display was so arranged that these windows were made definitely appealing to passers-by.

The interior was suitably arranged and decorated in an individual booth style.

Each of the manufacturers and the gas company paid a proportionate share of the expense. In addition, a schedule of newspaper advertising was run with each advertisement featuring the various products and each ad also including a listing of all the firms co-operating.

The dealers in Peoria have arranged with the gas company a program under which the gas company does not actively sell or install gas heaters. All prospects are turned over to one of the dealers. The gas company does, however, sell conversion burners direct. The company does not recommend any particular make of apparatus but give all the dealers an opportunity to explain their products.

The show was planned for a sixty-day display. All during the show salesmen from the gas company were in attendance. Also just as many salesmen as each dealer or manufacturer wished to have in his booth were permitted.

This excellent display and the publicity gained were made possible through co-operation between manufacturer, dealer and the gas company. All exhibitors announce that the benefit derived has made the display well worth while.

Above are two views of the display floor. Several manufacturers exhibited gas house heating equipment, either assembled or in sections. More than 5,000 persons viewed the display in the first 45 days

Pattern For Dust Collector Hood

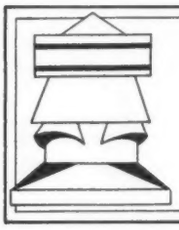
(*Continued from page* 32)

to the horizontal plane. The true length of this line by triangulation will be the hypotenuse of the triangle whose altitude is the line c'-d' and whose base is the line y-d in the end view. The true length of this line by revolving the line will be equal to the line d-" shown in the plan view.

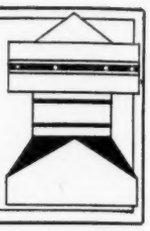
Swing an arc whose radius is equal to the length of the line cKd from point, d, on the pattern. The intersection of this arc with that of the diagonal from point, a, locates the point, c, on the pattern. The remaining portion of the pattern is developed in the same manner.

Pattern No. 5 is the pattern of the back side of the pipe. The line f-g is equal to the line f"-g". The line f-j is equal to the line a'-j'. The remaining portion of the pattern is developed by the same method that was used in developing pattern No. 4.

The accuracy of the pattern layout may be checked if so desired by making a cardboard fractional scale model of this unit. Clear lacquer has been found to work nicely as a cement for such a model, as it dries quickly and produces a stiff cemented joint.



GRAVITY EXHAUST VENTILATION



Kitchen Ventilation

By **PAUL R. JORDAN**

KITCHEN ventilation is somewhat different from other forms of residence ventilation because it has to deal with the getting rid of smoke and odors due to cooking. Most residence ventilation is concerned primarily with cooling. Residence ventilation for the furnishing of air for breathing purposes is chiefly concerned with the dilution of the inside air with pure air from outdoors.

Kitchen ventilation, however, having to do with the getting rid of smoke and odors, must make provision for exhausting these without allowing them to mix with the other air. The dilution system is not satisfactory. The smoke and odors must be withdrawn from the kitchen and not allowed to enter the other rooms.

Pockets Hold Odors

This necessity applies particularly to odors. Smoke, as long as it is not allowed to settle, is comparatively inoffensive, but odors, particularly fish, kale, cabbage, onions, etc., hang on for an unbelievably long time. This is perhaps due to the fact that they are almost perfectly diffused with the air, and that on account of the unventilated pockets of air below the ceiling, they are not cleaned out of the rooms.

These pockets are the spaces underneath the ceiling, and above the window and door openings. The warmest of the air naturally pockets in these spaces, where it remains banked and requires room circulation to relieve it. Room circulation for the most part takes place below the tops of the door and window openings, and these pockets of air are relatively stagnant.

This entire situation can be satisfactorily handled by exhaust registers at the ceiling, installed as described in the articles on residence ventilation. But these registers are usually not provided, and the pocketing remains.

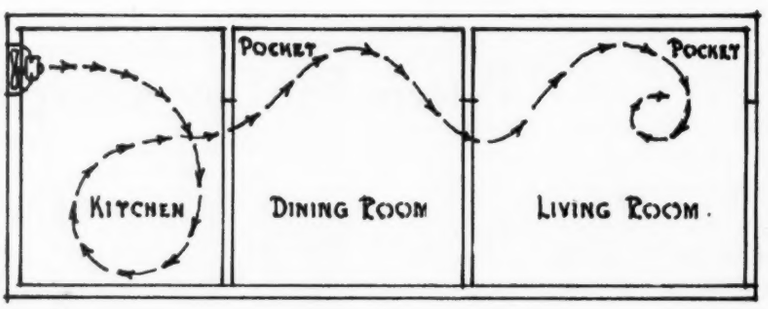
For satisfactory kitchen ventilation then, it is necessary that no odors shall back up from the kitchen into the rest of the rooms. This means that the kitchen must at all times be an area of lower pressure than the rest of the rooms. This shows the fallacy of kitchen intakes, as any intake will nullify this low pressure. The kitchen should be kept closed and should have a positive exhaust pulling constantly from it, this exhaust being stronger than any exhaust at any other point in the residence.

For the best ventilation results, kitchen windows and doors should be kept closed. Openings, nullifying the low pressure of the kitchen, will allow fumes to drift back into the other rooms. Of course, it is much worse where a fan is used for an intake. Dilution, or the freshening of bad air with good air, is practical for the other rooms, but a fan blowing fresh air into the kitchen simply forces the kitchen odors into the rest of the house.

Kitchen Fans

Some kitchen fans are made with a reversible feature. This feature should not be used, primarily because it defeats the very purpose of

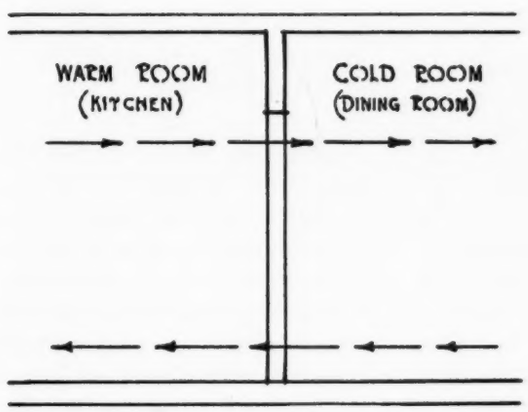
SHOWING FALLACY OF USING KITCHEN FAN FOR INTAKE



FAN PUMPS HOT SMOKY AIR DOWN FROM CEILING AND SENDS IT INTO THE OTHER ROOMS

Odors and smoke or fumes tend to work into pockets against the ceiling. Moving air then passes below the pocket without disturbing the air in the pocket. This is why odors linger so long

SHOWING CROSS CURRENTS OF AIR THROUGH THE SAME OPENING



AT TOP OF DOOR - FROM WARM TOWARD COLD

AT BOTTOM OF DOOR - FROM COLD TOWARD WARM

Unless you have made anemometer tests you probably don't know that when a door is opened two cross currents of air are set up. The higher current is warm air moving from the warm room to the cold room, while the lower current is just the reverse

kitchen ventilation. A prominent architect told me recently that he could tell the minute he stepped into his residence if the kitchen fan had been used reversed. Of course, he has given orders that it is not to be so used, but his orders are sometimes disregarded.

There is another reason why the kitchen fan should never be reversed, and that is that if it is installed at the proper point for exhausting, it is not in the right position for use as an intake. It will simply pump the hot air down onto the occupants.

Fan Location

The kitchen exhaust, whether a fan or a gravity ventilator, should always be placed at the extreme top of the room, directly underneath the ceiling. It should also be placed as far away from the inside entrance door as possible. And the inside entrance door should be kept closed, as well as the outside doors and windows. I realize that it is a hard matter to get cooks to leave windows closed in hot weather, but if there is a kitchen fan installed at the high point in the ceiling it will keep the heated air from accumulating and will make for as good a condition within the kitchen as possible. And there is nothing gained by pulling in from the outside, air that is hotter than the inside air.

The inside entrance door, that is, the door between the dining room and the kitchen, should be kept closed also for the best results. If it is left open for any length of time, the pressure balance between the two rooms is equalized, so that there is no very positive tendency to counteract the backing up of odors into the dining room. If, on the other hand, the door is kept closed excepting when someone goes through it, the momentary opening of the door will be accompanied by a rush of air from the dining room to the kitchen, which will sweep fumes before it.

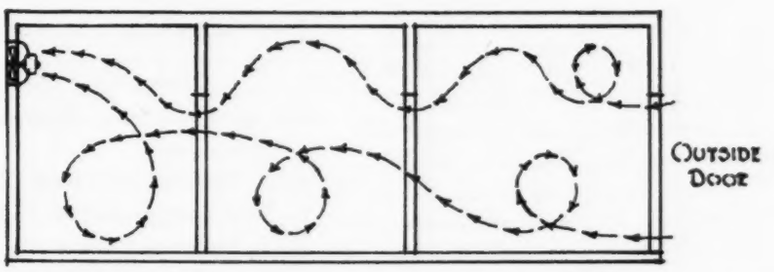
The backing up of fumes from the kitchen to the dining room is due to a simple phase of air movement which I have never seen emphasized in discussions of ventilation. I refer to the fact that you have, through any opening between rooms of different temperatures, a cross movement of air. The movement at the top of the door is from the warm room into the colder room. The movement at the floor is from the cold room to the warmer one. You have always noticed a draft of cold air sweep along the floor from the cooler room, but few have taken notice of the flow of warm air at the top of the same door into the cold room.

Air Currents

The kitchen is usually the warmer room. This means that the warmest of the kitchen air, that immediately below the ceiling, has a tendency to flow back into the dining room. And this warmest air from the kitchen is the very air which is laden with smoke and odors. If this flows back into the dining room, it pockets itself at the ceiling. From here it is forced on back by additional warm air from the kitchen; on through the farther door into the pocket underneath the ceiling of the living room, and so on through the entire house. And having found its way into these pockets it will remain there a long time.

Sheet metal contractors are being called on for kitchen fans. Installation of a kitchen fan is not particularly coupled with sheet metal work, but has proved a profitable line and there is no reason why

CONTINUOUS VENTILATION PROPERLY APPLIED



Contrary to some opinion, even small kitchen fans will pull air from several rooms, especially when the fan is permitted to run for some time. Short operation cycles do not set up currents strong enough to exhaust from distant rooms

the sheet metal contractor should not have this profit as well as anyone else. From the information that comes in, the sheet metal contractor's opportunity for kitchen ventilation comes from the home that is already built. Installations in houses in construction are likely to come through the general contractor. Even then, there is no reason why the sheet metal contractor should not furnish the kitchen fan, and have for his profit the regular discount to the trade.

Up-to-date sheet metal contractors are making definite efforts to sell jobs in the nature of repair and remodeling, on homes already built. The home owner is rather more likely to come to the sheet metal contractor than he is to the carpenter contractor for repairs; and particularly for ventilation. This gives him the first chance at kitchen ventilation on old residences.

There are two kinds of kitchen ventilation, one the continuous type and the other the clean-out type. The continuous type is that which withdraws a nominal amount of air continuously from the kitchen, maintaining a low pressure within the kitchen, toward which the air from the rest of the rooms will flow. The exhausted air should be taken from the point where fumes and smoke naturally accumulate, which is immediately below the ceiling, and as far as possible from the dining room door. Gravity or fan ventilation of the continuous type should be sufficient to change the air in the kitchen about every three minutes. If a fan is used the current consumption must necessarily be low; otherwise the cost of operation will be prohibitive.

Clean Out Fans

The clean-out type of fan is for use when an extreme amount of smoke or fumes are being produced for some unusual reason. It should be capable of changing the air in the kitchen in from 15 to 30 seconds. The current consumption is not an item of great importance, because the clean-out type of fan will only be used at intervals and for short periods. For ordinary residence or apartment work the continuous operating unit is more practical, both because it furnishes continuous kitchen ventilation and because it also operates to ventilate the entire residence or apartment.

Kitchen ventilation can be handled by either fans or gravity, but at the present time fans seem to appeal more to the housewife. Also they lend themselves somewhat better to installations in old houses. They should be located at the ceiling and should be operated continuously as long as the kitchen is in use. They should be used for exhausting only and doors and windows should be kept closed.

Illinois Travelers' Auxiliary Program

As usual, at the Illinois convention, the outstanding social feature was the annual banquet and dance in the grand ballroom of the Pere Marquette Hotel, given in honor of the contractors and their ladies by the Travelers' Auxiliary.

The entertainment at the dinner was furnished by 34 Chanters of Mohammed Temple Shrine of which A. C. McKinley, retiring president of the Travelers' Auxiliary, is a member. The music for the dancing was furnished by one of Peoria's best known orchestras and to add a little spice to the fun several country dance callers were invited in to take charge of the quadrilles which were interspersed with the regular ballroom dancing.

The annual meeting of the Auxiliary was held Thursday morning, April 7. Plans were made for the coming year and a committee appointed to work with the contractors in order to further the interests of both associations.

President
W. R. Weil, Chicago

Vice-President
M. H. Klett, Springfield

Secretary
Etta Cohn, Chicago

Treasurer
J. B. Sauer, Peoria

Sergeants at Arms
H. W. Symonds, St. Louis
Jules Gerock, Jr., St. Louis

Directors
Mat H. Friedman, Chicago, Chairman
A. C. McKinley, Peoria
L. Max Baugh, Galva
H. J. Niehaus, Peoria
F. S. Gottschalk, Chicago

Officers elected for the coming year are shown to the left.

Special votes of thanks were given to the retiring officers, to the Pere Marquette Hotel and to the Association of Commerce for their co-operation. Also, to Mat. Friedman for his work in getting out the Illinois Traveler which was voted the outstanding feature of last year's events, and which will be continued as a means of bringing into closer harmony the contractors, jobbers, travelers and manufacturers of Illinois.

Oliver T. Ingledew, one of the oldest and best known members of the Auxiliary, was voted an honorary member for life. This now gives the association two honorary life members—L. A. Denoyer of Ottawa and Oliver T. Ingledew of Chicago.

ASSOCIATION ACTIVITIES

Program of National Assn. of Sheet Metal Distributors

The twenty-first annual meeting of the National Association of Sheet Metal Distributors will be held in the Bellevue-Stratford Hotel, Philadelphia, Wednesday and Thursday, May 11 and 12. Following is an outline of the program as recently released:

"How Can Distributors Most Effectively Cooperate With the Mills?"—George H. Charls, President, National Association of Flat Rolled Steel Manufacturers, Cleveland, O.

"What the Mills Can Do to Improve Conditions in the Distribution of Black and Galvanized Sheets."—F. J. McNeive, Chairman of the Sheet Steel Committee, W. F. Potts Sons Co., Inc., Philadelphia, Pa.

"Progress in Promoting the Sale of Better Quality Galvanized Sheets."—Julian D. Conover, Secretary, American Zinc Institute, Inc., New York, N. Y.

"Promoting Sheet Copper Sales."—Carter S. Cole, Copper & Brass Research Association, New York, N. Y.

"What the Depression Has Taught Us."—Dr. Frank Parker, Professor of Finance, University of Pennsylvania, President Philadelphia Federation of the Construction Industry.

"The Distribution of Sheet Copper."—R. H. Binns, Revere Copper & Brass, Inc., Rome, N. Y.

"The Possibilities of Lead in Construction."—F. E. Wormser, Secretary-Treasurer, Lead Industries Association, New York, N. Y.

"What Are We Doing to Improve Conditions in Our Territory."—Franklin E. Devlin, Secretary, Metal Merchants Credit Association, New York, N. Y.

"Obtaining Net Profits Under Present Conditions."—Harry A. Hopf, H. A. Hopf & Co., Management Engineers, New York, N. Y.

"Recent Developments in Simplified Practice."—Edwin W. Ely, Chief of Division of Simplified Practice, Department of Commerce, Washington, D. C.

◆

"Old Guard" Meets and Elects Officers

The twenty-fourth annual meeting of the Old Guard Southern Hardware Salesmen's Association was held during the Southern Hardware Jobbers' Convention at the Edgewater Gulf Hotel, Biloxi, Mississippi, on April 20. The meeting was attended by twenty-five active members and was a most enjoyable affair.

Officers as follows were elected:

President

Hugo Weidmann, New Orleans, La.

First Vice-Pres.

Sheffield Clark, Nashville, Tenn.

Second Vice-Pres.

James Hutchinson, New York.

Secretary-Treasurer

R. P. Boyd, R. F. D. 4, Knoxville, Tenn.

Executive Committee

John E. Haviland, Port Chester, N. Y., Chairman.

C. M. Power, Kent, Ohio.

George T. Bailey, Pittsburgh, Pa.

John J. Gilmore, Birmingham, Ala.

Henry D. Archer, New Orleans, La.

George T. Price, Charleston, W. Va.

The Old Guard Southern Hardware Salesmen's Association, membership in which is limited to one hundred, is an honorary association composed of salesmen and traveling sales managers who have sold hardware, steel and kindred lines to the jobbing trade in five or more Southern and Southwestern states for fifteen years or longer.

◆

A. S. H. & V. E. Will Meet In Milwaukee, June 27 to 29

The American Society of Heating and Ventilating Engineers will hold the semi-annual meeting in the Hotel Pfister, Milwaukee, June 27, 28 and 29. Of the several important reports which will be presented, the report of the committee on Ventilation Standards will probably be of most interest to our industry.

All meetings will be held on Standard time. Considerable attention will be paid to committee reports and special papers completed since the winter meeting.

◆

Chicago Auxiliary Ladies Entertain Men

Taking advantage of the Leap Year privilege, the Ladies' Auxiliary of the Sheet Metal Employers' Association of Chicago invited their men to spend Friday evening, April 29, as their guests in Chinatown.

Starting out with a tour through the Chinese Chamber of Commerce and other points of interest, the party wound up with a real Chinese dinner at the Eastern Star Restaurant, 22nd and Wentworth Avenue.

Souvenirs appropriate to the occasion were given to all. Place cards were written in Chinese, and Hop Joy, proprietor of the restaurant, donated personally autographed chop sticks.

Mrs. A. B. Rysdon and Mrs. E. L. Stephani had charge of arrangements. Self-appointed master of ceremonies and toastmaster respectively, A. B. Rysdon and John W. Thomson made a hit. Charley Krutskoff, Elmer Olson, C. E. Jensen and Aubrey Sykes all said they had plenty of food, so the evening was voted a hundred percent success.

◆

Oil Burner Show Sets Record

The ninth annual oil burner convention and show which closed April 16 in Boston set an all-time record for public attendance and also for attendance from dealers and manufacturers.

More than 13,000 persons paid to see the various exhibits and examine the latest oil burner units.

Among the numerous interesting statements made during the convention was one by Ralph B. Wilson of the Babson Statistical Organization, who declared that there is an immediate market in 3,000,000 homes for oil burners and that the industry may well count on an annual sale of at least 200,000 burners.

◆

Coming Conventions

National Association of Sheet Metal Distributors—May 11 and 12, Philadelphia, Pa. Annual meeting. Headquarters, Bellevue - Stratford Hotel. George A. Fernley, secretary-treasurer, 505 Arch Street, Philadelphia, Pa.

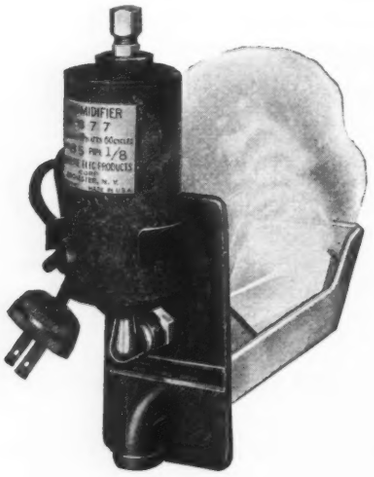
National Warm Air Heating Association—May 18 and 19, at Deshler-Wallick Hotel, Columbus, Ohio. Secretary, Allen W. Williams, 3440 A. I. U. Building, Columbus, Ohio.

New PRODUCTS

New High Pressure Humidifier

Supreme Electric Products Company, 425 South Clinton Ave., Rochester, N. Y., announces a new humidifier for warm air furnaces and air conditioning systems.

The humidifier operates on the principle of producing a fog of moisture by



shooting a fine stream of water under high pressure against a hot baffle plate. Humidity can be controlled by a Humidistat located on the first floor.

The new unit has a capacity of 20 gallons of water per day under 50 pounds pressure. This water capacity can be controlled by the pressure or by the upstairs control.

The feature of the unit is said to be the fact that its operates instantly regardless of the furnace heat pickup. The unit is said to be especially adaptable to intermittent fuel systems.

◆

Health Air Systems Announce "Auxilor"

The Health Air Systems Division of the Economy Baler Company at Ann Arbor, Michigan, announces the "Auxilor" or stack-loss eliminator, a piece of equipment designed primarily to increase the efficiency of the old installations or old type equipment.

The unit is of normal steel furnace construction, approximately the same height as a furnace but only one-half the diameter. It is installed immediately back of a furnace or boiler so that the stack passes into it. Then the stack from this new unit is turned into the chimney.

In the 1932 model, the first one to be generally offered, there is an automatic by-pass damper which is set to give a direct passage from the main furnace or boiler to the stack while the fire is being started. At approximately 250 degrees it closes, forcing the hot gases to travel throughout the "Auxilor" before entering the chimney—and thereby reducing average stack temperature from 25% to 40%, affecting an economy in fuel consumption of as much as one-third.

The "Auxilor" is twenty-eight inches in diameter and seventy inches high. The interior construction is of heavy welded anti-rust copper alloy steel, gas tight. An intake and outlet hot air duct connects the "Auxilor" with the room overhead at any desired points.

Installations are readily made in connection with warm air, steam or any other heating plant. Air washers, humidifiers or forced air circulators can be connected.

The company claims that the low 1932 price makes the "Auxilor" an easy accessory to sell on both new and old house jobs—alone or in connection with the installation of burners and stokers.

Pending the completion of distribution arrangements through state and regional distributors, shipments are being made direct to dealers in certain areas.

◆

New Fire-King Stoker

The Fire-King Stoker Company, Indianapolis, Indiana, has added to its line a new model which has been designed exclusively for use in household furnaces and boilers.

Rated at 950 square feet of steam radiation and with a maximum coal feed capacity of 40 pounds an hour, the new stoker, known as the Fire-King No. 3, is offered at the lowest price ever placed on any of the company's underfeed stokers.

A thermostat and stoker switch are included in the list price as standard equipment. The latter control, of special advantage in mild weather, is actuated by the chimney temperature to prevent the fire from going out regardless of the action of the thermostat.

Multiple feed control is provided, giving the user the advantage of being able to vary the amount of coal in any degree from one pound to the maximum of 40 pounds an hour. The air likewise can be regulated to comply with the requirements of the fuel. The hopper has a fitted cover for cleanliness.

The company states that the average warm-air furnace installation can be completed in three to four hours' time. The installation can be made from either the front or side of the furnace.

The Fire-King No. 3 is designed to burn one-inch nut and slack screenings and is conservatively rated on the basis of 10,000 B. t. u. coal.

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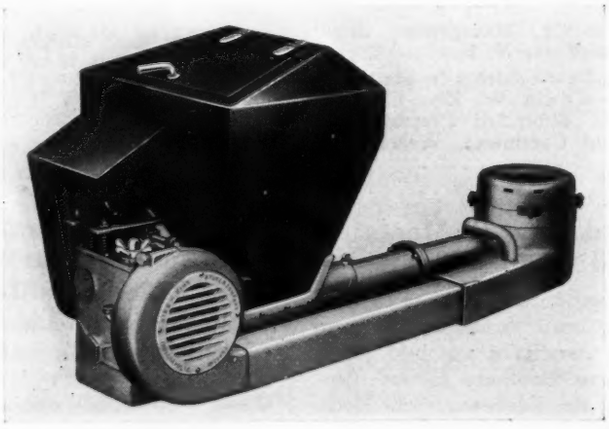


News Items . . . . . .

Lamneck Company Auctioned

By order of the U. S. District Court, Industrial Plants Corp. will on Thursday, Friday and Saturday, May 19, 20 and 21, sell at public auction the entire land and buildings, merchandise, machinery, dies, patents, furniture and fixtures of the W. E. Lamneck Company of 416 Dublin Ave., Columbus, Ohio.

The W. E. Lamneck Company of Columbus, Ohio, is one of the largest manufacturers in the United States of furnace pipe, stove pipe, registers, laundry dryers, agricultural products, etc.

◆

Kelvinator Appoints Oil Burner Sales Manager

Charles Van Maanen, formerly Assistant General Sales Manager in the Maise Corporation, has been appointed active head of oil burner sales for the Kelvinator Corporation, it was announced today by H. W. Burritt, Vice-President in charge of sales of the various Kelvinator divisions.

This appointment follows the announcement on April 13th that Kelvinator Corporation had purchased the assets and patents of the Rightway Oil Burner, manufactured by the Maise Corporation of Detroit. Kelvinator will begin merchandising the Rightway Oil Burner immediately through its New York and Detroit branches, and plans are being made to contact old distributors of the Rightway burners at once.

◆

Mechanical Warm Air Heating Handbook

H. S. Ridler, mechanical engineer of Minneapolis, Minn., has just published a Mechanical Warm Air Heating Manual, covering the practical installation and design of mechanical and gravity work. The manual also deals with air washing and cooling, and steam and hot water as applied to the warm air heating contractor.

Of general interest is a table of estimated square inches of pipe area required for either mechanical or gravity installations. From this table pipe area for each room, basement duct area, furnace and fan size can be readily determined.

This manual is designed to aid the heating contractor in designing and laying out this type of work. It is also intended as a practical aid to estimating heating requirements and costs, besides giving many short and practical rules and miscellaneous information and data.

◆

Survey Shows "Lean" Months Mostly Imaginary

New construction and modernization averages closely for each month in the year, says the American Builder and Building Age, basing its computation on five-year averages.

As a result of research it has been found that of the total sum spent each year in building and reconstruction work, the average totals for each month run as follows:

January	6.3%	July	9.3%
February	6.7%	August	8.8%
March	8.8%	September	8.6%
April	9.7%	October	8.5%
May	9.4%	November	7.5%
June	9.4%	December	7.6%

One interpretation of these figures is the presumption that heating contractors should not abandon efforts to sell new equipment, especially for replacement work, in the months that are generally conceded to be "lean."

JUST A MOMENT PLEASE!

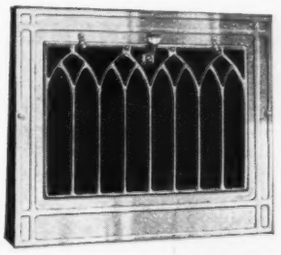
for the Good of Your Business...

WE know what you furnace installers are up against. There never was a time when the public was as all-fired "choosey" as it is today. It demands the pinnacle of quality at the lowest price and usually gets it. Hence you can't afford to overlook quality in any item in your proposition.

That's why it's just plain good sense to be more than ever concerned over the registers you handle. The outstanding quality, design and air capacity of H & C registers are things that you can be proud of. "Plus" features that will help sell the job; and goodness knows all the "pluses" are needed today.

The complete H & C line contains registers ideally suited to every type of installation. You pay no premium for their exceptional quality. Why not standardize on them.

Leading jobbers carry complete stocks.

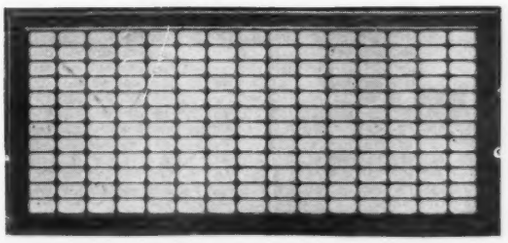


No. 110 Baseboard Register

Its pleasing design and all around superiority always win enthusiastic approval.

No 255 Cold Air Face

Superior by any comparison you wish to make. Available in two shades of oak and all other standard finishes.



WROUGHT STEEL H&C WARM AIR REGISTERS

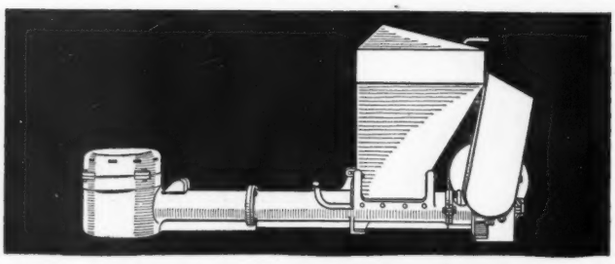
HART & COOLEY MFG. CO.

CHICAGO, 61 West Kinzie Street PHILADELPHIA, Architects Bldg.

New Britain, Conn., Corbin Ave. New York, 101 Park Ave.
Boston, 75 Portland Street

Factories at Holland, Mich.—New Britain, Conn.

Registers for all purposes. Also a complete line of perforated and cast ornamental grilles, furnace regulators, dampers, pulleys, chain, and the H & C Automatic Heat Control.



Announcing a NEW HOUSEHOLD STOKER

Here is a new, small stoker, conservatively rated at 950 square feet of steam radiation, designed by experienced stoker engineers . . . Made right . . priced right . . . with real sales appeal because it gives *more stoker per dollar.* It is not a plaything . . . or a cut-down commercial job, but a substantial, tested stoker that can be sold with profit to meet the demand for automatic heat in the household.

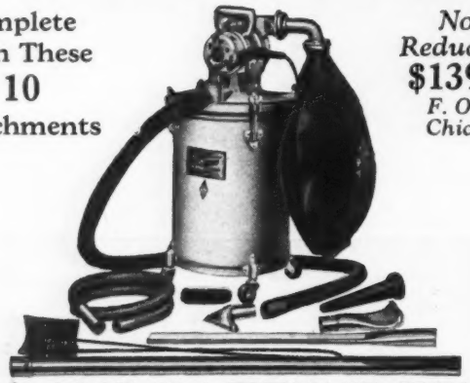
Trade Mark Registered

Fire-King Stoker Company, Indianapolis, Ind.

FIRE-KING
Automatic Stokers

Breuer's Ball Bearing
1932 TORNADO FURNACE CLEANER

Complete With These 10 Attachments



Now Reduced to **$139.50** *F. O. B. Chicago*

WHAT GOOD IS A FURNACE CLEANER WITHOUT THE RIGHT TOOLS?

You must have all of these 10 tools to clean thoroughly all types of warm air furnaces and hot water boilers. $29.75 worth of extra attachments—that's what you get with a TORNADO Furnace Cleaner at no additional cost! They save approximately one hour on every cleaning job. Think what this means to you in extra profits.

Actually a one man outfit—100 per cent portable—weight only 30 pounds.

Far greater vacuum cleaning power—proved by comparison—½ H.P. G.E. Motor—ball bearing throughout—no oiling.

Removes all loose dirt from air system without taking down pipes—an exclusive BLOWER feature of the TORNADO.

We invite comparison of the TORNADO ***point for point—price, portability, weight AND POWER.*** We will ship the TORNADO on three days' free trial—no obligation—so that you can test our claims.

And you will want our new sales plan book that shows you how to go into the furnace cleaning business and earn profits that pay for the TORNADO in a few weeks. Write today.

BREUER ELECTRIC MFG. CO.
865 BLACKHAWK STREET CHICAGO, ILLINOIS

New Literature . . . . . .

A Correction!

In the issue of April 25 on our New Products page we gave the address of the Breuer Electric Company, manufacturers of the Tornado furnace cleaner, as Grand Rapids, Mich.

The correct address is 865 Blackhawk Street, Chicago, Ill. We beg your pardon.

◆

New Catalogues By Motor Wheel Corp.

Three new descriptive and illustrated pieces of sales literature are now available to M-W dealers and distributors, and concerns interested in M-W Oil Burning Utilities.

The largest of the three is a twelve page catalogue devoted to the new M-W *Gyro-Flame* Boiler Units. Numerous illustrations give views of the new boilers and burners while cut-away drawings and descriptive text present the construction and operation principles.

The remaining two pieces are six page catalogue-folders descriptive of M-W Oil Burning Commercial Water Heaters and M-W Domestic Water Heaters. Both of these are as completely descriptive and as thoroughly illustrated in color as the twelve page catalogue. These catalogues describe the two types of water heater made by M-W.

Copies of any or all these catalogues can be had by writing the company at Lansing, Mich.

◆

Through Thick and Thin for 34 Years

American Nickeloid Company, Peru, Illinois, have published a very attractive little booklet under the title given above. The booklet is the company's method of thanking customers for their patronage and also calls attention to the fact that this year marks the thirty-fourth anniversary of the formation of the company. If you would like a copy, one can be secured by writing to the company.

◆

New Peerless Foundry Leaflet

The Peerless Foundry Company, Indianapolis, Indiana, has issued a new four-page leaflet describing the company's Boiler Plate Furnace with Pressure Heat Tubes. The leaflet shows the construction of this feature and gives complete details of the new product.

There is also information on the Peerless radiator used with this furnace and some description of how the new features operate.

Copies of the leaflet may be secured from the manufacturer.

◆

Revised Price on Stove Bolts

Notice is given by The Lamson and Sessions Company, 1971 West 85th St., Cleveland, Ohio, of lower prices on stove bolts. These prices may be obtained by writing the company.

New Literature . . . .

Security Stove New Gas Catalogue

Security Stove and Manufacturing Company, 1630 Oakland Ave., Kansas City, Mo., have prepared a new and revised gas furnace catalogue which is unusually complete in its contents and information covered.

The catalogue shows the company's line of gas furnaces in exterior, cut-away and sectional views. These views are accompanied by full descriptions and explanations. There are also descriptions and explanations of such furnace parts as burners, humidifiers, and controls.

Some very interesting and informative data are presented, some of the data for the first time. For instance, there is a section explaining how gas furnaces are rated, a full explanation and abbreviated table of degree days for calculating heating requirements, information on sizing warm air leaders, tables of register sizes for various leaders and return air areas for different warm air requirements.

The company calls particular attention to a special formula for determining gas fuel costs. The formula adopted takes into consideration the heat loss between bonnet to register.

Copies of the new catalogue can be obtained by writing the company.

◆

New Technical Products Catalogue

Technical Products Co., Pittsburgh, have issued Insa-Lute Cement and Compound catalogue number 32.

The catalogue contains instructive information or industrial assembling, insulating, acid-proofing, etc.

There are numerous illustrations and complete discussions of the various uses and methods of applying the material.

A copy of the catalogue will be sent to anyone requesting it.

◆

American Rolling Mill Architectural Bulletin

The American Rolling Mill Company, Middletown, Ohio, has ready for mailing to any contractor interested, a new architectural catalogue describing how air conditioning was provided for the new Louisiana State Capitol.

The bulletin is attractively prepared and interesting to read. A rather complete description of the operation of the system is given, accompanied by explanations of the fabrication details.

◆

New Independent Register Folder

Independent Register and Mfg. Co., 3747 East 93rd St., Cleveland, have published a new folder which describes the company's complete line of "Fabrikated" registers and grilles. Tables of sizes and accompanying fittings are also given. Copies of the folder can be secured from the company.

Where to Look for Business

Not in new buildings. But old furnaces have a habit of wearing out and burning out, in bad times as well as good. They must be replaced. So, look to the basements for replacement jobs. They are to be had, if you go after them, and can offer the quality, wide range of types and sizes and reasonable prices of the Moncrief line.

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Pacific Coast Representative
McPherson Furnace & Equipment Co., Seattle, Wash.

Distributors:

Chicago Furnace Supply Co., Chicago, Ill.
Moncrief Furnace Co., Indianapolis, Ind.
The F. H. Lawson Co., Cincinnati, Ohio.
Johnson Furnace Co., Kansas City, Mo.
E. A. Higgins Co., Omaha, Neb.
J. M. & L. A. Osborn Co., Buffalo, N. Y.
Geo. H. Cole Supply Co., Troy, N. Y.
W. H. Landers Co., Syracuse, N. Y.
Springfield Plumbing Supply Co., Springfield, Mass.
Sheet Metal Supply Co., Milwaukee, Wis.
Northern Metal & Mfg. Co., Green Bay, Wis.
Schrader-Easley Co., Memphis, Tenn.
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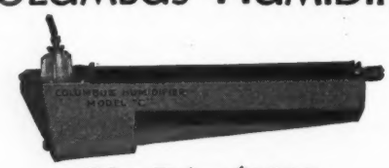

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AIR WASHERS

Health Air Systems, Ann Arbor, Mich.
Hess Warming & Vent. Co., Chicago, Ill.

ASBESTOS COVERING AND PAPER

Standard Asbestos Co. of Chicago, Chicago, Ill.

BLAST GATES

Berger Bros. Co., Philadelphia, Pa.

BLOWERS

Health-Air Systems, Ann Arbor, Mich.
Hess Warming & Vent. Co., Chicago, Ill.
Henry Furnace & Fdy. Co., Cleveland, Ohio

BRAKES—BENDING

Dreis & Krump Mfg. Co., Chicago, Ill.
Interstate Machinery Co., Chicago, Ill.

BRAKES—CORNICE

Dreis & Krump Mfg. Co., Chicago, Ill.

BRASS AND COPPER

American Brass Co., Waterbury, Conn.
Revere Copper and Brass, Inc., Rome, N. Y.

BURNERS—OIL

Laco Oil Burner Co., Griswold, Iowa

CASTINGS—MALLEABLE

Fanner Mfg. Company, Cleveland, Ohio

CEILINGS—METAL

Globe Iron Roofing and Corrugating Company, Cincinnati, Ohio
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.

CEMENT—FURNACE

Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.

CHAIN—FURNACE

Hart & Cooley Mfg. Co., Chicago, Ill.

CHAPLETS

Fanner Mfg. Company, Cleveland, Ohio

CLEANERS—FURNACE VACUUM

Breuer Elec. Mfg. Co., Chicago, Ill.
Brillion Furnace Co., Brillion, Wis.
Densmore & Quinlan Co., Kenosha, Wis.
National Super Service Co., Toledo, Ohio

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Berger Bros. Co., Philadelphia, Pa.
Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City

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Berger Bros. Co., Philadelphia, Pa.
Brown Wales Co., Boston, Mass.
Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio
David Levow, New York, N. Y.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Rival Strap Corp., New York, N. Y.

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Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.

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Brown Wales Co., Boston, Mass.
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Bertsch & Company, Cambridge City, Ind.

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Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City

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Hart & Cooley Mfg. Co., Chicago, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City
Parker-Kalon Corp., New York, N. Y.
Young Ventilating Co., Cleveland, Ohio

DIFFUSERS—AIR DUCT

Aeolus Dickinson, Chicago, Ill.

DRIVE SCREWS—HARDENED METALLIC

Parker-Kalon Corp., New York

EAVES TROUGH

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Berger Bros. Co., Philadelphia, Pa.
Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City

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Berger Bros. Co., Philadelphia, Pa.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City

FANS—FURNACE

A-C Mfg. Company, Pontiac, Illinois

FILTERS—AIR

American Air Filter Co., Inc., Louisville, Ky.
Owens-Illinois Glass Co., Toledo, Ohio

FILTERS—FURNACE

American Air Filter Co., Inc., Louisville, Ky.
Owens-Illinois Glass Co., Toledo, Ohio

BUYERS' GUIDE

FLUXES—SOLDERING

Kester Solder Company, Chicago, Ill.

FORMING ROLLS

Bertsch & Company, Cambridge City, Ind.
Interstate Machinery Co., Chicago, Ill.

FURNACE CLEANERS

(See Cleaners—Furnace Vacuum)

FURNACE PIPE AND FITTINGS

Peerless Foundry Co., Indianapolis, Ind.

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Dail Steel Products Co., Lansing, Mich.
Health-Air Systems, Ann Arbor, Mich.

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Henry Furnace & Foundry Co., Cleveland, Ohio
Lennox Furnace Co., Marshalltown, Iowa
Meyer Furnace Company, Peoria, Ill.
Payne Furnace and Supply Co., Beverly Hills, Calif.
Round Oak Furnace Co., Dowagiac, Mich.

FURNACES—GAS AUXILIARY

Forest City Foundries Co., Cleveland, Ohio

FURNACES—OIL BURNING

Motor Wheel Corp., Heater Div., Lansing, Mich.

FURNACES—WARM AIR

(See Also Unit Air Conditioners)
Agricola Furnace Co., Gadsden, Ala.
Andes Range & Furnace Corp., Geneva, N. Y.
Brillion Furnace Co., Brillion, Wis.
Dail Steel Products Co., Lansing, Mich.
Deshler Foundry & Machine Works, Deshler, Ohio
Floral City Heater Co., Monroe, Mich.
Forest City Foundries Co., Cleveland, Ohio
Health-Air Systems, Ann Arbor, Mich.
Henry Furnace & Fdy. Co., Cleveland, Ohio
Hess Warming & Vent. Co., Chicago, Ill.
Lennox Furnace Co., Marshalltown, Iowa
May-Fiebeger Furnace Co., Newark, Ohio
Meyer Furnace Co., The, Peoria, Illinois
Motor Wheel Corp., Heater Div., Lansing, Mich.
Mt. Vernon Furnace & Mfg. Co., Mt. Vernon, Ill.
Payne Furnace & Supply Co., Beverly Hills, Calif.
Peerless Foundry Co., Indianapolis, Ind.
Round Oak Furnace Co., Dowagiac, Mich.

GAGES—DRAFT

Ellison Draft Gage Co., Chicago, Ill.

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Auer Register Co., Cleveland, Ohio.
Harrington & King Perforating Co., Chicago, Ill.
Hart & Cooley Mfg. Co., Chicago, Ill.
Independent Register & Mfg. Co., Cleveland, Ohio.
Rock Island Register Co., Rock Island, Ill.
United States Register Co., Battle Creek, Mich.

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HANDLES—BOILER

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HANDLES—FURNACE DOOR

Fanner Mfg. Co., Cleveland, Ohio.

HANDLES—SOLDERING IRON

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HEATERS—CABINET

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Mt. Vernon Furnace & Mfg. Co., Mt. Vernon, Ill.
Payne Furnace & Supply Co., Beverly Hills, Calif.

HEATERS—SCHOOL ROOM

Meyer Furnace Company, The, Peoria, Ill.

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Columbus Humidifier Co., Columbus, Ohio.
Hess Warming & Vent. Co., Chicago, Ill.
Meyer & Bro. Company, F., Peoria, Ill.
Sallada Mfg. Co., Minneapolis, Minn.

MACHINERY—CULVERT

Bertsch & Co., Cambridge City, Ind.
Interstate Machinery Co., Chicago, Ill.

MACHINERY—REBUILT

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MACHINES AND TOOLS—TINSMITH'S

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Viking Shear Co., Erie, Pa.
Whitney Mfg. Co., W. A., Rockford, Ill.

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PERFORATED METALS

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Meyer & Bro., F., Peoria, Illinois.
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Parker-Kalon Corp., New York, N. Y.
W. A. Whitney Mfg. Co., Rockford, Ill.

PUNCHES—COMBINATION BENCH AND HAND

Parker-Kalon Corp., New York, N. Y.

PUNCHES—HAND

Parker-Kalon Corp., New York, N. Y.
W. A. Whitney Mfg. Co., Rockford, Ill.

RADIATOR CABINETS

Hart & Cooley Mfg. Co., Chicago, Ill.

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Auer Register Co., Cleveland, Ohio.
Forest City Foundries Co., Cleveland, Ohio.
Hart & Cooley Mfg. Co., Chicago, Ill.
Henry Furnace & Fdy. Co., Cleveland, Ohio.
Independent Register & Mfg. Co., Cleveland, Ohio.
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Peerless Foundry Co., Indianapolis, Ind.
United States Register Co., Battle Creek, Mich.

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Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.

REGULATORS—AUTOMATIC HEAT

Hart & Cooley Mfg. Co., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
White Mfg. Co., Minneapolis, Minn.

REPAIRS—STOVE AND FURNACE

Des Moines Stove Repair Co., Des Moines, Iowa.
Northwestern Stove Repair Co., Chicago, Ill.
Peerless Foundry Co., Indianapolis, Ind.

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Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio.
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RINGS—FURNACE CASING

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Inland Steel Company, Chicago, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Newport Rolling Mill Co., The, Newport, Ky.
Republic Steel Corp., Youngstown, Ohio.

ROOFING—TIN AND TERNE

Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Newport Rolling Mill Co., Newport, Ky.
Republic Steel Corp., Youngstown, Ohio.

RUBBISH BURNERS

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Parker-Kalon Corp., New York City.

SCREWS—HARDENED SELF TAPPING SHEET METAL

Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Parker-Kalon Corp., New York City.

SCREENS—PERFORATED METAL

Harrington & King Perforating Co., Chicago, Ill.

SCUPPERS

Aeolus Dickinson, Chicago, Ill.

SHEARS—HAND AND POWER

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Marshalltown Mfg. Co., Marshalltown, Iowa.
Viking Shear Company, Erie, Pa.

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SHEETS—ALLOY

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International Nickel Co., New York, N. Y.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Newport Rolling Mill Co., Newport, Ky.
Republic Steel Corp., Youngstown, Ohio.

SHEETS—BLACK, CORRUGATED, GALVANIZED

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Granite City Steel Co., Granite City, Ill.
Inland Steel Company, Chicago, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Newport Rolling Mill Co., Newport, Ky.
Republic Steel Corp., Youngstown, Ohio.

SHEETS—COPPER

American Brass Co., Waterbury, Conn.
Revere Copper & Brass, Inc., Rome, N. Y.

SHEETS—COPPER BEARING STEEL

American Rolling Mill Co., Middletown, O.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., Chicago, Ill.

BUYERS' GUIDE

Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Newport Rolling Mill Co., Newport, Ky.
Republic Steel Corp., Youngstown, Ohio.

SHEETS—COPPER (LEAD COATED)

American Brass Co., Waterbury, Conn.
Revere Copper & Brass, Inc., Rome, N. Y.

SHEETS—IRON

American Rolling Mill Co., Middletown, O.
Granite City Steel Co., Granite City, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Newport Rolling Mill Co., Newport, Ky.
Republic Steel Corp., Youngstown, Ohio.

SHEETS—MONEL METAL

International Nickel Co., New York.

SHEETS—NICKEL

International Nickel Co., New York.

SHEETS—PURE IRON COPPER ALLOY

Newport Rolling Mill Co., Newport, Ky.

SHEETS—REFINED OPEN HEARTH IRON

American Rolling Mill Co., Middletown, O.

SHEETS—SPECIAL FINISH

American Rolling Mill Co., Middletown, O.
Inland Steel Company, Chicago, Ill.
Newport Rolling Mill Co., Newport, Ky.
Republic Steel Corp., Youngstown, Ohio.

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SKYLIGHTS

Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.

SNOW GUARDS

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David Levow, New York, N. Y.
Rival Strap Corp., New York, N. Y.

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Brown Wales Co., Boston, Mass.
Kester Solder Co., Chicago, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.

SOLDER—ACID CORE

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Fire-King Stoker Co., Indianapolis, Ind.

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Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.

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Rival Strap Corp., New York, N. Y.

STRAPS—ORNAMENTAL PIPE

David Levow, New York, N. Y.
Rival Strap Corp., New York, N. Y.

TINPLATE

Brown Wales Co., Boston, Mass.
Granite City Steel Co., Granite City, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Republic Steel Corp., Youngstown, Ohio.

TOOLS—TINSMITH'S

(See Machines & Tools—Tinsmith's)

UNIT AIR CONDITIONERS

Andes Range & Furnace Corp., Geneva, N. Y.
Dail Steel Products Co., Lansing, Mich.
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Health-Air Systems, Ann Arbor, Mich.
Hess Warming & Ventilating Co., Chicago, Ill.
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May-Fiebeger Company, Newark, Ohio.
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Motor Wheel Corp., Lansing, Mich.
Payne Furnace & Supply Co., Beverly Hills, Calif.

VACUUM CLEANERS—FURNACE

(See Cleaners—Furnace Vacuum)

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Independent Reg. & Mfg. Co., Cleveland, Ohio.

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VENTILATORS—ROOF

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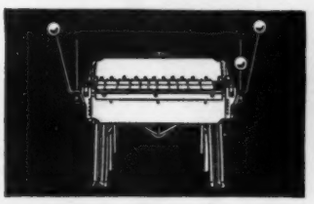
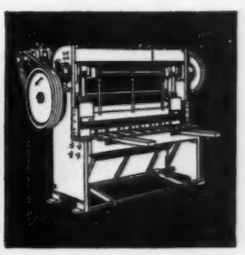


Box and Pan Brake



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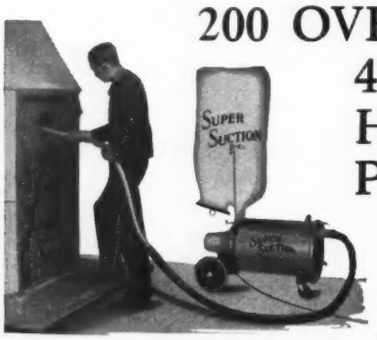
200 OVERHAULS 42 NEW HEATING PLANTS!



The new model; lighter, more compact; same husky motor, ½ H.P. plus; suction 60% more; new style big bag; suit-case bag, clean, for ups airs, extra; full Line of tools; prices lower.
With A Tools.....$131
With B Tools..... 151

That is what the Jacobs Heating & Engineering Company, Flint, Mich., sold by cleaning 651 jobs, which alone paid them well.

Beside that, they took in 175 repair sales.

There is plenty of business for those who own these strong, quick, one-man outfits. They easily uncover needed repairs and new heating plants, by first selling cleanings. Can't you make this a banner year too?

Would you like to see the Plan Book which they used? It is free, and shows how they got these sales. Do you know how you can first try this good Super Suction before you decide to keep it? And then to let it pay for itself? Easy. Send this clipping with your name and address on it, to

The NATIONAL SUPER SERVICE CO.
1944 NORTH 13th STREET TOLEDO, OHIO

RIVAL STRAP CORP. 308 WEST 20th ST. NEW YORK, N. Y.

The "RIVAL" and "FITRITE"
One-Piece Ornamental Leader Straps
Patented July 10th, 1928; Jan. 6th, 1931
MADE IN SIX STYLES
Write for folder showing complete line and sizes
STRAPS SOLD THROUGH JOBBERS ONLY

"Fitrite" Bronze Beehive Strainer
For Round Leader
3"-4"-5"-6"-7"-8" Dia.

Type "X"

"FITRITE" Bronze ROOF STRAINERS
3 types for roofs having inside cast iron leaders. Type "X" also made in malleable iron

"Fitrite" Mop Head & Staples
Malleable Iron

"FITRITE" Adjustable PIPE SNOW GUARDS
Galvanized Iron or Bronze
Patent Pending

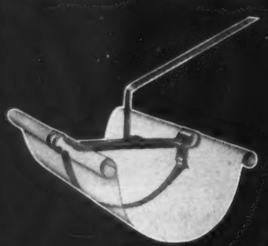
"FITRITE" SKYLIGHT GEARING

Iron or Bronze ⅜", ½" and 1" sizes.
Made also for chain operation.

Write Dept. "A" for full details and prices. Telephone: CHelsea 3-2400

DAVID LEVOW 308 WEST 20TH ST. NEW YORK

"BB" Quality



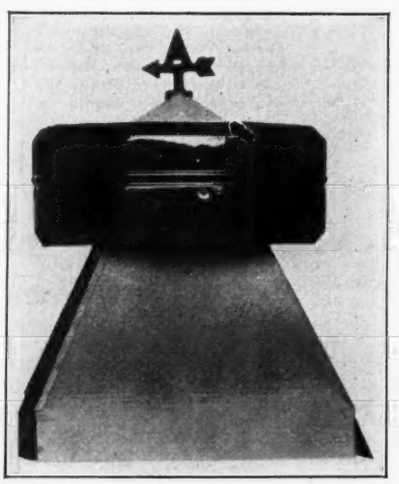
'THE RIVAL' STRAP HANGER
for single bead and double bead gutter

Build up a reputation with "BB" Products
CARRIED BY LEADING JOBBERS EVERYWHERE

Eaves Trough
Conductor Pipe
Conductor Fasteners
Mitres
End Pieces and Caps
Conductor Heads
Ornamental Straps
Ventilators, etc.

BERGER BROTHERS COMPANY
229-237 Arch St. Philadelphia, Pa.

The JORDAN ATTIC VENTILATOR



Straight flaring base. Sets low and looks well. Operated by gravity and wind action.
No. 17 — Capacity 15,000 cubic feet per hour.
No. 21 — Capacity 21,000 cubic feet per hour.

The Jordan Attic Ventilator presents an opportunity which offers profits to you *right now*. Write for information. There is summer business to be had and you can get it.

Backed by a complete engineering service.

PAUL R. JORDAN CO.
631 S. Delaware St., Indianapolis, Ind.

CLASSIFIED ADVERTISING

BUSINESS CHANCES

LIGHTNING RODS

Dealers who are selling Lightning Protection will make money by writing to us for our latest Factory to Dealer Prices. We employ no salesmen and save you all overhead charges. Our Pure Copper Cable and Fixtures are endorsed by the National Board of Fire Underwriters and hundreds of dealers. Write today for samples and prices. Address L. K. Diddie Company, Marshfield, Wis.

SITUATIONS OPEN

WANTED—A WORKING FOREMAN, also one journeyman sheet metal worker, for all-around sheet metal shop. Must be hustlers and capable. Give full details as to experience in different branches; age; union or non-union; wages expected; reference; etc. Address Key 140, "American Artisan," 1900 Prairie Avenue, Chicago, Illinois.

PRESS ROOM FOREMAN—MAN THOROUGHLY experienced in operation of Dies and Presses on stove work. State age, experience and wages expected. Steady employment for right man. James Graham Manufacturing Co., Newark, California.

EXPERIENCED FURNACE SALESMAN wanted. Must be experienced in forced air and gravity heating. Address Key 132, "American Artisan," 1900 Prairie Avenue, Chicago, Illinois.

WANTED—ALL-AROUND SHEET METAL worker at once. Small city in central Wisconsin. Must be a hustler. Address Key 131, "American Artisan," 1900 Prairie Avenue, Chicago, Illinois.

SITUATIONS WANTED

MANUFACTURERS OF WARM AIR furnaces and heating appliances, will find in me an unusual opportunity for your sales promotion work. I understand the furnace and fitting business through years of actual experience from installation, dealers, and sales manager for wholesale purposes. Am a graduate engineer, know forced air, gravity, standard code, air conditioning, designing of systems for sales work, etc. Member of A.S.H.E. I desire connection with manufacturer as sales representative or branch manager, best of references. Address Key 125, "American Artisan," 1900 Prairie Ave., Chicago, Ill.

SITUATION WANTED—CAN YOU MAKE use of this ability? Complete knowledge of and wide experience in every phase of warm air heating, selling, designing, installing. Thorough knowledge of every essential of repair work, advertising and sales promotion experience of high type. A good working knowledge of domestic air conditioning. Experienced in training and developing salesmen. Ready after April 20. Address Key 126, "American Artisan," 1900 Prairie Avenue, Chicago, Ill.

SITUATION WANTED—BY MAN 38 years old. 15 years' experience in general hardware. Best references. Address L. J. Bergman, Iowa Falls, Ia.

SITUATION WANTED—FOR A SHEET metal apprentice, 4 years' trade school training, high school graduate, one year's experience in general sheet metal work. Good character, exceptional references. The type of apprentice that will prove an asset to any progressive sheet metal shop. Address Sheet Metal Department, Mooseheart, Ill.

SITUATION WANTED—A-1 SHEET metal and heating man with twenty years' experience. Can do plumbing; also welding, brazing and silver soldering. Have had experience on electric refrigerator experimental work. Can furnish reference. Address Key 130, "American Artisan," 1900 Prairie Avenue, Chicago, Illinois.

SITUATION WANTED—BY AN ALL around sheet metal worker. Can handle any branch of the trade such as cornice, skylights, ventilation and hot air heating and conditioning. Can make estimates and run the shop prefer a position with good hardware company or job shop. Will go any place. Address Key 139, "American Artisan," 1900 Prairie Avenue, Chicago, Illinois.

WANTED—POSITION BY FIRST CLASS sheet metal worker. Can do anything in that line. Also, can do estimating and designing of dust and shaving collecting systems. Able to take complete charge of shop and show results. Address Arno Goethel, 20—8th St., N.E., Rochester, Minn.

SITUATION WANTED—HAVE HAD 28 years' experience as tinner and plumber. Am qualified to do work in the following lines: auto radiator repairing, erecting steel ceilings, pump and windmill repairing, steam and hot water work, installing radios, and any kind of mechanical job that comes in a shop. Can give good references. Address Key 121, "American Artisan," 1900 Prairie Avenue, Chicago.

SITUATION WANTED—A FIRST CLASS, A-1 Mechanic with more than twenty years' experience in all lines of the sheet metal trade wishes to hear from someone who needs a first class man. Can give best of references and go anywhere. Address Edward H. Collins, 154 Oakland Avenue, Macon, Georgia.

FOR SALE

FOR SALE—NEW CHRISTIE FURNACE cleaner used only on few jobs. Will sell at a sacrifice price. Address Frank Sehy & Son, 1206 So. Clay Avenue, Jacksonville, Illinois.

FOR SALE—ONE SETTING DOWN MAchine and stand. One adjustable 30" pipe folder. One large Buffalo groover. One combination pipe cutter and crimper. All the above tools are in good order, the first $50.00 check received will get at least $150.00 worth of tools. Jack Laurie, Churubusco, Ind.

FOR SALE—A 42" PEXTO AND WILCOX square shears, in good shape, complete with back and front gauges. Will take $50.00 cash. Address Key 136, "American Artisan," 1900 Prairie Avenue, Chicago, Illinois.

FOR SALE—ONE 30-SQUARING SHEARS, Good condition. Address Key 133, "American Artisan," 1900 Prairie Avenue, Chicago, Illinois.

FOR SALE—COMBINATION SHEET metal and plumbing shop southwest Kansas town; population 9,000. Apartment in shop and house on ground can be rented out. Will adjust inventory to suit buyer. Address H. F. Dobson, Wichita, Kansas.

LINES WANTED

LINES WANTED—EXPERIENCED FURnace salesman covering Iowa is open for some side lines on commission basis. Address Louis Roos, 1614 East 8th St., Des Moines, Ia.

MR. MANUFACTURER—DO YOU WANT California business? Aggressive salesman—Thoroughly familiar with heating and sheet metal industry is anxious to line up with good manufacturer who can use increased business from California territory. I have sold to both jobber and installer. Address Key 137, "American Artisan," 1900 Prairie Avenue, Chicago, Illinois.

WANTED TO BUY

WANTED TO BUY—ONE 8 OR 10-FOOT steel brake. Address Key 134, "American Artisan," 1900 Prairie Avenue, Chicago, Illinois.

WANTED TO BUY — OR TO RUN — A shop doing sheet metal and furnace work in a town in Minnesota or South Dakota. I am an A-1 man and would like to buy a shop if it were in a good town. Address Key 138, "American Artisan," 1900 Prairie Avenue, Chicago, Illinois.

MISCELLANEOUS

ST. LOUIS TECHNICAL INSTITUTE

4543 Clayton Avenue, St. Louis, Mo.

Specialized Technical Training

Forced Warm Air Heating.
Air Conditioning.
Heating Ventilating Engineering.
Sheet Metal Design and Pattern Drafting.
Contracting and Estimating.

Prepare for a bigger opportunity. Write for full particulars on your choice of work.

DO IT NOW

PHILIP V. W. PECK

Patent and Trade Mark Law
Barrister Bldg., Washington, D. C.

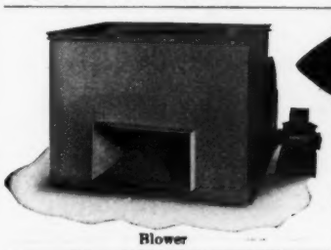
FULL SIZE PATTERNS FOR BOATS

Building up-to-date Outboard Boats, Canoes, Hunting and Fishing Boats with our full size paper patterns.
Sectional or One-Piece
Write for Free Illustrated Folder No. 11
H. F. THOMPSON Boat and Pattern Works
Decorah, Iowa. Dept. A.

ENGINEER

Correspondence solicited with manufacturer developing or producing air conditioning units, or with contractor specializing in fan heating. Twenty years' practical experience; member A. S. H. V. E., A. S. M. E.

G. A. VOORHEES, 633 So. Delaware St., Indianapolis, Ind.



Blower

Air Conditioning

• The Health Air Blower A Complete Air Conditioner •

for New or Old Installations

Low Priced ***Write for our Attractive Proposition*** **Efficient**

HEALTH AIR SYSTEMS, 1105 N. Main St., Ann Arbor, Mich.

AIV Conditioner

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By Order of the United States District Court for the Southern District of Ohio, Eastern Division, in the matter of The Weirton Steel Company vs. The W. E. Lamneck Company (In Equity No. 964).

We will sell at

PUBLIC AUCTION

Entire Merchandise, Machinery, Dies, Furniture and Fixtures, Real Estate, Accounts Receivable, etc., etc.

of

THE W. E. LAMNECK CO.

416-436 DUBLIN AVE., COLUMBUS, OHIO

Thursday, Friday and Saturday
May 19, 20 and 21, 1932
(Starting promptly at 10 A. M. each day)

VALUE—
APPROXIMATELY $400,000.00!

SALE COMPRISES: Entire large and high grade stock of Furnace Pipe, Stove Pipe & Fittings; Supplies; Tools; Line of Agricultural Products; Lamneck Gas & Electric Laundry Dryers; Large quantity of new Tin Plate, Galvanized and Black Sheets and other Raw Materials; Hot & Cold Air Registers; . . . . Complete, Modern Machinery for Manufacture of Lamneck Products; Electric Motors; large quantity of Modern Office Furniture & Equipment; also, complete sets of very valuable Dies for the manufacture of each item in the Lamneck line.

A most unusual opportunity for Manufacturers, Jobbers, Wholesalers, Dealers, etc., to buy highest grade staple Merchandise, Machinery, Dies, etc., etc., at your own price! Everything will be offered in lots to suit the trade.

INSPECTION: Premises are open for inspection daily.

A complete detailed, descriptive catalog is available free for the asking!

Receiver: Perl F. Miller, 9 E. Long St., Columbus, Ohio.
Atty. for Receiver: B. G. Watson—Watson, Davis & Joseph, A. I. U. Bldg., Columbus, Ohio.

For any further information apply to:

F. R. SHORE, *Official U. S. Auctioneer*

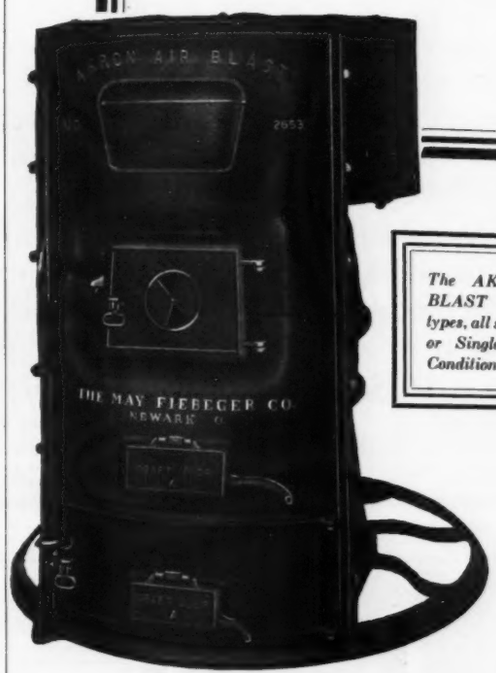
Industrial Plants Corporation (Ohio)
Auctioneers - Appraisers - Liquidators
HUNTINGTON BANK BLDG., COLUMBUS, OHIO

25 Church St., New York City	Nicholas Bldg. Toledo, Ohio	Standard Bank Bldg. Cleveland, Ohio

For

AIR CONDITIONING REQUIREMENTS SPECIFY THE

AKRON AIR BLAST



The AKRON AIR BLAST offers two types, all sizes, Gravity or Single Unit Air Conditioning.

AIR Conditioning in a very short time has made very impressive advances. Your prospects are being educated from day to day. With the first upturn of business, there will be a tremendous Air Conditioning field open to furnace dealers.

You will serve best and profit most by meeting the requirements of home owners with a complete plant which will give 100% Air Conditioning. One which can boast of ease of installation without the necessity for extras.

You can meet the requirements best with the AKRON AIR BLAST.

The MAY-FIEBEGER Co.
NEWARK - OHIO

GOOD BUSINESS IS HERE!!

ENTHUSIASM WORK ORDERS PROFITS

We are cheerful and enthusiastic about business for 1932. You will be also if we can present our proposal to you. Conditions are tough for ordinary selling of ordinary equipment. Unusually efficient sales methods and equipment of unusual merit and salability, are urgently needed for 1932. What are you going to do about it?

Every day is valuable now if you only know it, and profits are possible if you will act at once. Do not wait for better times as improvement will only come thru a real merchandising plan and hard work.

We have an excellent plan to make sales for you, a plan that is actually working already for many dealers. The new Hess Furnace line, the improved Hess Air Conditioner, and of utmost importance an exclusive merchandising plan, with literature, cards, display, attractive premium and advertising features, have all been prepared to help the dealer sell rather than to sell the dealer.

We are taking on dealers daily, the best in the country, and they recognize that our plan, or an equal one, is not only desirable but necessary for 1932 conditions. These dealers are pleased, and are making sales as you will also, with the Hess plan. Come and see us or write for particulars. It will pay you well.

HESS WARMING & VENTILATING COMPANY

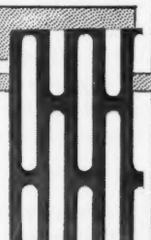
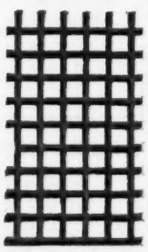
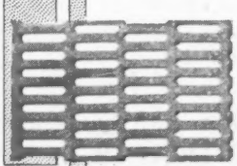
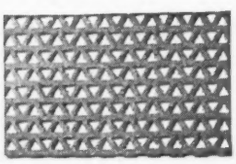
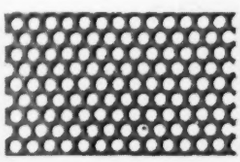
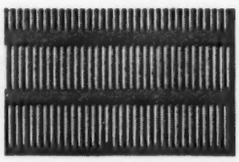
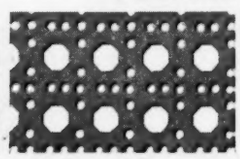
BRANCH
3215 W. NORTH AVENUE
MILWAUKEE, WIS.

FACTORY AND GENERAL OFFICES
1211-1229 S. WESTERN AVENUE
CHICAGO, ILL.

BRANCH
3931-33 GRAND RIVER AVE.
DETROIT, MICH.

Perforated Metals *for every requirement*

Steel, Brass, Bronze, Copper, Monel
Aluminum, Stainless Iron, Zinc
or any other metal
PERFORATED TO YOUR ORDER
Round holes from .020" to 7" Diam.
Oblong and Slot holes from .008" to 3" wide.
Grilles of distinction for fine buildings
Everything in Perforated Metal

THE HARRINGTON & KING PERFORATING CO.

5649 FILLMORE ST., CHICAGO, ILL., U. S. A. NEW YORK OFFICE, 114 LIBERTY ST.

GOOD WILL PAYS DIVIDENDS

..... EVEN IN LEAN YEARS

Even by a tremendous stretch of the imagination, 1930 cannot be credited as a good year for business. Yet, during most of 1930, Harvey M. Blackwood, owner of this sheet metal plant in Columbus, Ohio, worked a double force of men. And here's his secret—he attributes his better than normal business to the fact that he specialized in Toncan Iron, insured the good will of his customers and built up a heavy repeat business.

Hundreds of sheet metal plants are finding Toncan Iron easy and profitable to work. Its first cost is a trifle higher. Its cost to work is less. Yet because of its reputation for quality—its proved longer life due to its resistance to rust—it can be sold to net a greater profit and to build good will for your plant at the same time.

A trial of Toncan Iron on a job where other materials are hard to work or are unsatisfactory from the standpoint of service rendered, will convince you. A sample to demonstrate the working qualities of Toncan Iron will be sent upon request.

REPUBLIC STEEL CORPORATION

GENERAL OFFICES YOUNGSTOWN, OHIO

You and Your Customers Profit from GOOD MATERIALS

YOU CAN CUT THE CUSTOMER'S BILL now by using cheap materials, but you cannot cut his repair bills of the future.

It's a sad awakening for the contractor, too, when his customer discovers that low first cost and low-yearly cost do not always go together in sheet metal work. Both pay dearly for poor materials.

When the customer says, "the cheapest you have," for your own protection, as well as his, explain the economy of low-yearly cost. Tell him that in sheet metal construction, the cost of labor is the major expenditure, often amounting to sixty per cent of the total cost. The only way to reduce this expense is to use a metal that will give many years of trouble-free service. That puts the responsibility for future repair bills squarely up to him.

An ounce of dissatisfaction will offset a pound of good will, even with your most valued customers.

THE AMERICAN ROLLING MILL COMPANY

Executive Offices: Middletown, Ohio

Distributors in the principal cities of the United States and Canada

INSTRUCT YOUR SALESMEN *to always mention the familiar Armco triangle and what it stands for: twenty-six years of rust-resisting, low-cost service.*

INGOT IRON SHOP NEWS

Frameless Metal-House Now Being Constructed May Open New Field For All Sheet Metal Men

Metal Plays Major Part In Keeping Bakery Clean

BETTER SELLING

READ "INGOT IRON SHOP NEWS" every month for ideas and suggestions on how to stimulate sales, cut costs, and turn out better work. Published by the Armco Distributors Association, this valuable business-building paper is free to anyone concerned with metal work. Write us if you want to get it regularly.

PROFITS COME WITH BETTER SELLING

ARMCO PRODUCTS

Help you sell